JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. (ADVANCED MANUFACTURING SYSTEMS)

EFFECTIVE FROM ACADEMIC YEAR 2019- 20 ADMITTED BATCH

R19 COURSE STRUCTURE AND SYLLABUS

I Year I Semester

Course Code	Course Title	L	T	P	Credits
Professional Core-I	Automation in Manufacturing	3	0	0	3
Professional Core-II	Theory of Metal Cutting	3	0	0	3
Professional Elective - I	1. Design for Manufacturing & Assembly 2. Advanced Manufacturing Processes 3. Product Data Management	3	0	0	3
Professional Elective - II	1. Optimization Techniques & Applications 2. Precision Engineering 3. Additive Manufacturing Technologies	3	0	0	3
	Research Methodology & IPR	2	0	0	2
Lab - I	Automation Lab	0	0	4	2
Lab - II	Advanced Manufacturing Processes & Metal Cutting Lab	0	0	4	2
Audit - I	Audit Course- I	2	0	0	0
	Total	**16**	**0**	**8**	**18**

I Year II Semester

Course Code	Course Title	L	T	P	Credits
Professional Core - III	Computer Aided Manufacturing	3	0	0	3
Professional Core - IV	Manufacturing Systems: Simulation Modelling & Analysis	3	0	0	3
Professional Elective - III	1. Materials Technology 2. Quality Engineering in Manufacturing 3. Advanced Tool Design	3	0	0	3
Professional Elective - IV	1. Total Quality Management 2. Concurrent Engineering 3. Industrial Robotics	3	0	0	3
	Mini Project with Seminar	0	0	4	2
Lab - III	Advanced CAD/ CAM Lab	0	0	4	2
Lab - IV	Simulation of Manufacturing Systems Lab	0	0	4	2
Audit - II	Audit Course - I	2	0	0	0
	Total	**14**	**0**	**12**	**18**

II Year I Semester

Course Code	Course Title	L	T	P	Credits
Professional Elective - V	1. Production and Operations Management 2. MEMS 3. Flexible Manufacturing Systems	3	0	0	3
Open Elective	Open Elective	3	0	0	3
Dissertation	Dissertation Work Review - II	0	0	12	6
	Total	**6**	**0**	**12**	**12**

II YEAR II - SEMESTER

Course Code	Course Title	L	T	P	Credits
Dissertation	Dissertation Work Review - III	0	0	12	6
Dissertation	Dissertation Viva-Voce	0	0	28	14
	Total	**0**	**0**	**40**	**20**

***For Dissertation Work Review - I, Please refer 7.8 in R19 Academic Regulations.**

Audit Course I & II:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

AUTOMATION IN MANUFACTURING (Professional Core - I)

Prerequisites: Production Technology, Machine Tools, Operations Research

Course Objectives:

- Lower Cost and Improve Time-to-Market
- Automation investment life-cycle analysis
- Empowered teams of talented employees
- Partnering with automation suppliers
- On-line process analysis
- Procedural process control
- Information integration and data warehousing

Course Outcomes: Upon completion of this course the student will be able to:

- Illustrate the basic concepts of automation in machine tools.
- Analyze various automated flow lines, Explain assembly systems and line balancing methods.
- Describe the importance of automated material handling and storage systems.
- Interpret the importance of adaptive control systems, automated inspection systems.

UNIT-I:

Introduction to Automation: Automation in Production Systems-Automated Manufacturing Systems, Computerized Manufacturing Support Systems, Reasons for Automation, Automation Principles and Strategies. Manufacturing operations, Production Concepts and Mathematical Models. Costs of Manufacturing Operations, Basic Elements of an Automated Systems, Advanced Automation Functions, Levels of automation.

UNIT-II:

Introduction to Material Handling: Overview of Material Handling Equipment, Considerations in Material Handling System Design, the 10 Principles of Material Handling. Material Transport Systems, Automated Guided Vehicle Systems, Monorails and other Rail Guided Vehicles, Conveyor Systems, Analysis of Material Transport Systems. Storage Systems, Storage System Performance, Storage Location Strategies, Conventional Storage Methods and Equipment, Automated Storage Systems, Engineering Analysis of Storage Systems. Automatic data capture-overview of Automatic identification methods, bar code technology, other ADC technologies.

UNIT -III:

Manual Assembly Lines - Fundamentals of Manual Assembly Lines, Alternative Assembly Systems, Design for Assembly, Analysis of Single Model Assembly Lines, Line balancing problem, largest candidate rule, Kilbridge and Wester method, and Ranked Positional Weights Method, Mixed Model Assembly Lines, Considerations in assembly line design.

UNIT-IV:

Transfer lines, Fundamentals of Automated Production Lines, Storage Buffers, and Applications of Automated Production Lines. Analysis of Transfer Lines with no Internal Storage, Analysis of Transfer lines with Storage Buffers.

UNIT-V:

Automated Assembly Systems, Fundamentals of Automated Assembly Systems, Design for Automated Assembly, and Quantitative Analysis of Assembly Systems - Parts Delivery System at

Work Stations, Multi- Station Assembly Machines, Single Station Assembly Machines, Partial Automation.

TEXT BOOKS:

1. Automation, Production systems and computer integrated manufacturing by Mikel P. Groover, Pearson Education.

REFERENCE BOOKS:

1. CAD CAM: Principles, Practice and Manufacturing Management by Chris Mc Mohan, Jimmie Browne, Pearson edu. (LPE)
2. Automation by Buckinghsm W, Haper & Row Publishers, New York, 1961
3. Automation for Productivity by Luke H.D, John Wiley & Sons, New York, 1972.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

THEORY OF METAL CUTTING (Professional Core - II)

Pre- requisites: Engineering graphics, Mechanics of solids, Heat Transfer, Machine Tools, Strength of Materials, Material Science and Metallurgy.

Course Objectives:

- To impart the knowledge of basic methodology of metal cutting.
- To educate the student about the structure, working, forces involved in single point and multipoint cutting tools.
- To understand the concepts of tool life, machinability, wear, influence of heat.
- To design the jigs and fixtures required for machine tools.

Course Outcomes: Students can analyze the machining processes in terms of input variables like

- Speed, feed, depth of cut and their influence on surface roughness and performance measures, Metal removal rate, tool wear rate, machining time, energy, work done, heat distribution.

UNIT – I:
Mechanics of Metal Cutting: Geometry of Metal Cutting Process, Chip formation, Chip thickness ratio, radius of chip curvature, cutting speed, feed and depth of cut – Types of chips chip breakers.
Orthogonal and Oblique cutting processes – definition, Forces and energy calculations (Merchant's Analysis) – Power consumed – MRR- Effect of Cutting variables on Forces, Force measurement using Dynamometers.

UNIT – II:
Single Point Cutting Tool: Various systems of specifications, single point cutting tool geometry and their inter-relation. Theories of formation of built-up edge and their effect, design of single point contact tools throwaway inserts.

UNIT – III:
Multipoint Cutting Tool: Drill geometry, design of drills, Rake & Relief angles of twist drill, speed, feed and depth of cut, machining time, forces, milling cutters, cutting speed &feed machining time-design – from cutters.
Grinding: Specifications of grinding of grinding wheel, mechanics of grinding, Effect of Grinding conditions on wheel wear and grinding ratio. Depth of cut, speed, machining time, temperature power.

UNIT – IV:
Tool Life and Tool Wear: Theories of tool wear – adhesion, abrasive and diffusion wear mechanisms, forms of wear, Tool life criteria and machinability index.
Types of sliding contact, real area of contact, laws of friction and nature of frictional force in metal cutting. Effect Tool angle, Economics, cost analysis, mean co-effect of friction.

UNIT – V:
Cutting Temperature: Sources of heat in metal cutting, influence of metal conditions, Temperature distribution, zones, experimental techniques, analytical approach. Use of tool- work thermocouple for determination of temperature. Temperature distribution in Metal Cutting.
Cutting fluids: Functions of cutting fluids, types of cutting fluids, properties, selection of cutting fluids**.**
Cutting tool materials: Historical developments, essential properties of cutting tool materials, types, composition and application of various cutting tool materials, selection of cutting tool materials.

TEXT BOOKS:

1. Metal Cutting Principles/ MC Shaw / Oxford and IBH Publications, New Delhi, 1969
2. Fundamentals of Machining /Boothryd/ Edward Amold publishers Ltd 1975.

REFERENCES:

1. 'Tool Design' by David Son / Lacain/ Goud, Tata Me Graw Hill.
2. Fundamentals of Tool Design by Wilson fw, ASTME PHI 2010.
3. Technology of machine tools, Steve F. Krar, Arthur R. Gill and Peter Smid, McGraw Hill Education (India) Pt. Ltd., 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

DESIGN FOR MANUFACTURING AND ASSEMBLY (Professional Elective - I)

Prerequisites: Manufacturing Processes, Engineering Materials

Course Objectives: The objective of course is identify the manufacturing constraints that influence the design of parts and part systems. Students will be introduced to the Design for Manufacturability (DFM) methodology, and will be motivated to understand infeasible or impractical designs.

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

- Understand the quality aspects of design for manufacture and assembly
- Apply Boothroyd method of DFM for product design and assembly
- Apply the concept of DFM for casting, welding, forming and assembly
- Identify the design factors and processes as per customer specifications
- Apply the DFM method for a given product

UNIT - I:

Introduction: Design philosophy steps in Design process - General Design rules for manufacturability - basic principles of design Ling for economical production - creativity in design. Materials: Selection of Materials for design Developments in Material technology - criteria for material selection - Material selection interrelationship with process selection process selection charts.

UNIT - II:

Machining Process: Overview of various machining processes - general design rules for machining - Dimensional tolerance and surface roughness - Design for machining - Ease - Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts. **Metal Casting**: Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances - use of solidification simulation in casting design - product design rules for sand casting.

UNIT - III:

Metal Joining: Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints - design of brazed joints. Forging - Design factors for Forging - Closed dies forging design - parting lines of dies drop forging die design - general design recommendations. Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking.
Plastics: Viscoelastic and Creep behavior in plastics – Design guidelines for Plastic components – Design considerations for Injection Moulding.

UNIT-IV

Assemble Advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.
Automatic Assembly Transfer Systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

UNIT-V:

Design of Manual Assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and

fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

TEXT BOOKS:

1. Assembly Automation and Product Design/ Geoffrey Boothroyd/ Marcel Dekker Inc., NY, 1992.
2. Engineering Design - Material & Processing Approach/ George E. Deiter/McGraw Hill Intl. 2nd Ed. 2000.
3. Hand Book of Product Design/ Geoffrey Boothroyd/ Marcel and Dekken, N.Y. 1990.

REFERENCES:

1. Computer Aided Assembly London/ A Delbainbre/.
1. Product Design for Manufacturing and Assembly/ Geoffrey Boothroyd, Peter Dewhurst & Winston Ansthony Knight/CRC Press/2010

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

ADVANCED MANUFACTURING PROCESSES (Professional Elective - I)

Prerequisites: Production Technology, Machine Tools, Metal Cutting, Material Science.

Course Objectives:

- To make acquainted the various unconventional manufacturing processes
- To know about the applications of advanced manufacturing processes (which are exceptional)
- To encourage the students for developing the models of Advanced Manufacturing Processes

Course Outcomes: At the end of the course, the student will be able to understand the working principle of Electron beam, laser beam and laser beam processes.

- Able to understand different types of composite material characteristics, types of micro & macro machining processes.
- Understand the e-manufacturing & nano materials.

UNIT-I:
Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT-II:
Non-Traditional Machining: Introduction, need, AJM, Parametric Analysis, Process capabilities, USM –Mechanics of cutting, models, Parametric Analysis, WJM –principle, equipment, process characteristics, performance, EDM – principles, equipment, generators, analysis of R-C circuits, MRR, Surface finish, WEDM.

UNIT-III:
Laser Beam Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.
Plasma Arc Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.
Electron Beam Machining - Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.
Electro Chemical Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

UNIT-IV:
Processing of ceramics: Applications, characteristics, classification. Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application, finishing of ceramics.
Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

UNIT-V:
Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics.
E-Manufacturing, nanotechnology, micromachining and High-speed Machining, basic principles, working, applications, advantages.

TEXT BOOKS:

1. Manufacturing Engineering and Technology by Kalpakijian, Addison Wesley, 1995.
2. Foundation of MEMS by Chang Liu, Pearson, 2012.
3. Advanced Machining Processes by V. K. Jain, Allied Publications.

REFERENCE BOOKS:

1. Process and Materials of Manufacturing by R. A. Lindburg, 4th edition, PHI 1990.
2. Introduction to Manufacturing Processes by John A Schey, Mc Graw Hill.
3. Micro Machining of Engineering Materials by J. Mc Geough, CRC Press.
4. Non-Traditional Manufacturing Processes by Gary F Benedict, CRC Press.
5. Advanced Methods of Machining by J. A Mc Geough, Springer.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

PRODUCT DATA MANAGEMENT (Professional Elective - I)

Prerequisites: Management Science

Course Objectives:

- Competence with a set of tools and methods for product design and development.
- Confidence in own abilities to create a new product.
- Awareness of the role of multiple functions in creating a new product (e.g. marketing, finance, industrial design, engineering, production).
- Ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.
- Reinforcement of specific knowledge from other courses through practice and reflection in an action-oriented setting.
- Enhanced team working skills.

Course Outcomes:

- After doing this course, the student should be able to understand the need of Industrial Product & Development, customer needs & Design aspects of new products.
- Able to involve customer into the development of new products and managing requirements
- Able to understand the design of experiments and technical analysis
- Know product architecture
- Investigate the customer requirement and survey of problems
- Design for manufacture and do prototyping

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 ARCHITECTURE: Implications – Product change – variety – component standardization – 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 Product 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 project execution.

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, ISBN 0-202-41369-5.
3. Production and Operations Management/Chase/TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

OPTIMIZATION TECHNIQUES AND APPLICATIONS (Professional Elective - II)

Pre-requisites: Operations Research

Course Objectives: The main objectives of the course are: Learn

- Numerical optimization techniques for single variable and multi variable non- linear optimization problems.
- Sensitivity analysis on LPP queuing
- Simulation of annexing problem & inventory problem.
- Geometry cutting plane method & branch bound method for linear IPP.
- Meaning of stochastic programming problem simple problems for finding mean variance of random variables chance constrained algorithm.
- Formulation of GP model and solving it using arithmetic geometric inequality theorem.
- State of art nontraditional optimization technique, namely genetic algorithm simulated annealing & particle swarm optimization.

Course Outcomes: At the end of the course, the student is able to apply appropriate optimization techniques and solve.

- Based on the type of optimization problem like single variable or multivariable,
- Make sensitivity analysis to study effect of changes in parameters of LPP on the optimal solution without reworking.
- Simulate the system to estimate specified performance measures.
- Solve integer programming problem by either geometry cutting plane algorithm or branch band method.
- Apply chance constrained algorithm and solve stochastic linear programme.
- Formulate GP model and solve it.
- Solve given optimization problem by genetic algorithm or simulated annealing or PSO.

UNIT-I:
Single Variable Non-Linear Unconstrained Optimization: Elimination methods: Uni-Model function-its importance, Fibonacci method & Golden section method. Interpolation methods: Quadratic & Cubic interpolation methods.

UNIT-II:
Multi variable non-linear unconstrained optimization: Direct search methods – Univariant method, Pattern search methods – Powell's, Hook -Jeeves, Rosenbrock search methods. Gradient methods: Gradient of function& its importance, Steepest descent method, Conjugate direction methods: Fletcher-Reeves method & variable metric method.

UNIT-III:
Linear Programming: Formulation, Simplex method & Artificial variable optimization techniques: Big M & Two-phase methods. Sensitivity analysis: Changes in the objective coefficients, constants& coefficients of the constraints. Addition of variables, constraints. Simulation – Introduction – Types-steps – applications: inventory & queuing – Advantages and disadvantages.

UNIT-IV:
Integer Programming: Introduction – formulation – Geometry cutting plane algorithm – Zero or one algorithm, branch and bound method

Stochastic Programming: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution. Stochastic linear programming: Chance constrained algorithm.

UNIT-V:

Geometric Programming: Posynomials – Arithmetic - Geometric inequality – unconstrained G.P-constrained G.P (≤ type only)

Non-Traditional Optimization Algorithms: Genetics Algorithm-Working Principles, Similarities and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing-Working Principle-Simple Problems. Introduction to Particle Swarm Optimization (PSO) (very brief)

TEXT BOOKS:

1. Optimization theory & Applications by S. S. Rao, New Age International.
2. Optimization for Engineering Design by Kalyanmoy Deb, PHI

REFERENCE BOOKS:

1. Operations Research by S. D. Sharma
2. Operation Research by H. A. Taha, TMH
3. Optimization in operations research by R. L Rardin
4. Optimization Techniques by Benugundu & Chandraputla, Pearson Asia.
5. Optimization Techniques theory and practice by M.C. Joshi, K. M. Moudgalya, Narosa Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

PRECISION ENGINEERING (Professional Elective - II)

Pre-requisites: Machine Tools, Metrology

Course Objectives:

- To give the basic precision engineering methodology and state-of-the-art concepts for designing high-precision CNC machines and products.
- The course is specifically tailored to teach the novel design principles leading to improved machine performance and reliability.
- To apply the acquired knowledge to other design efforts and fields as well

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

- Apply fits and tolerances for parts and assemblies according to ISO standards.
- Apply selective assembly concept for quality and economic production.
- Assign tolerances using principles of dimensional chains for individual features of a part or assembly.
- Evaluate the part and machine tool accuracies.
- Analyze the causes for dimensional and geometrical errors prior to and during machining and suggest remedies

UNIT- I:

Concepts of Accuracy: Introduction – Concept of Accuracy of Machine Tools – Spindle and Displacement Accuracies – Accuracy of numerical Control Systems – Errors due to Numerical Interpolation Displacement Measurement System and Velocity Lags.

Geometric Dimensioning and Tolerance: Tolerance Zone Conversions – Surfaces, Features, Features of Size, Datum Features – Datum Oddly Configured and Curved Surfaces as Datum Features, Equalizing Datum –Datum Feature of Representation – Form Controls, Orientation Controls – Logical Approach to Tolerance.

UNIT-II:

Datum Systems: Design of freedom, Grouped Datum Systems – different types, two and three mutually perpendicular grouped datum planes; Grouped datum system with spigot and recess, pin and hole; Grouped Datum system with spigot and recess pair and tongue – slot pair – Computation of Transnational and rotational accuracy, Geometric analysis and application.

UNIT-III:

Tolerance Analysis: Process Capability, Mean, Variance, Skewness, Kurtosis, Process Capability Metrics, C_p, C_{pk}, Cost aspects, Feature Tolerances, Geometric Tolerances.

Tolerance Charting Techniques: Operation Sequence for typical shaft type of components, Preparation of Process drawings for different operations, Tolerance worksheets and central analysis, Examples. Design features to facilitate machining; Datum Features – functional and manufacturing. Components design – Machining considerations, Redesign for manufactured parts examples

UNIT–IV:

Surface finish, Review of relationship between attainable tolerance grades and different machining process. Cumulative effect of tolerances sure fit law, normal law and truncated normal law.

UNIT-V:

Measuring Systems Processing: In process or in-situ measurement of position of processing point-Post process and on-machine measurement of dimensional features and surface-mechanical and optical measuring systems.

TEXT BOOKS:

1. Precision Engineering in Manufacturing by Murthy R. L., New Age International (P) limited, 1996.
2. Geometric Dimensioning and Tolerancing by James D. Meadows, Marcel Dekker Inc. 1995.

REFERENCE BOOK:

1. Engineering Design – A systematic Approach by Matousek, Blackie & Son Ltd, London.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

ADDITIVE MANUFACTURING TECHNOLOGIES (Professional Elective - I)

Prerequisites: Basics of Manufacturing, Basic knowledge in Calculus, Physics, Thermodynamics, and Chemistry

Course Objectives: The objective of the Course is to study methods used in additive manufacturing, theories governing the additive manufacturing, give information on materials, explain relations between materials to be processed and methods of additive manufacturing with introduction to common machines used for the technology and show applications and business opportunities with future directions.

Course outcomes:

- Understand the fundamentals for additive manufacturing and how it is different and discuss about various types of liquid based, solid based and powder-based AM technologies.
- Understand the various types of Pre-processing, processing, post-processing errors in AM. Also to know the various types of data formats and software's used in AM.
- Know the various applications of AM in design analysis, aerospace, automotive, biomedical and other fields.

UNIT–I:

Introduction: Prototyping fundamentals: Need for time compression in product development, Need for Additive Manufacturing, Historical development, Fundamentals of Additive Manufacturing, AM Process Chain, Advantages and Limitations of AM, Commonly used Terms, Classification of AM process, Fundamental Automated Processes: Distinction between AM and CNC, other related technologies.

UNIT–II:

Liquid-based AM Systems: Stereo lithography Apparatus (SLA): Models and specifications, Process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, Case studies. Solid ground curing (SGC): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Poly jet: Process, Principle, working principle, Applications, Advantages and Disadvantages, Case studies. Micro fabrication.

Solid-based AM Systems: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Multi-Jet Modelling (MJM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

UNIT–III:

Powder Based AM Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three-dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

Laser Engineered Net Shaping (LENS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Electron Beam Melting (EBM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies

Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Arc Spray Metal Deposition, Investment Casting, Sand Casting, 3D Keltool process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

UNIT–IV:

AM Data Formats: Reengineering for Digital Representation, STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats. Mesh Refining by Sub division Techniques.

AM Software's: Need for AM software, Features of various AM software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor, Surgi Guide, 3-matic, Simplant, Mesh Lab.

UNIT–V:

AM Applications: Application – Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Biomolecules. Web Based Rapid Prototyping Systems

TEXT BOOK:

1. Rapid prototyping: Principles and Applications by Chua C.K., Leong K.F. and LIM C.S, World Scientific publications, Third Edition, 2010.

REFERENCE BOOKS:

1. Rapid Manufacturing by D.T. Pham and S.S. Dimov, Springer, 2001.
2. Wholers Report 2000 by Terry Wohlers, Wohlers Associates, 2000.
3. Rapid Prototyping & Engineering Applications by Frank W.Liou, CRC Press, Taylor & Francis Group, 2011.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

RESEARCH METHODOLOGY AND IPR

Prerequisite: None

Course Objectives:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

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

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I:
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II:
Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT-III:
Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV:
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V:
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

REFERENCES:

1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
7. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

AUTOMATION LAB (Lab - I)

Note: Conduct any Ten exercises from the list given below:

1. Draw the circuit diagram to operate single acting pneumatic cylinder using 3/2 push button direction control valve.
2. Draw the circuit diagram to operate double acting pneumatic cylinder using 5/2 direction control valve using push button momentary switch/push button latch.
3. Draw the circuit diagram to operate single acting pneumatic cylinder using 5/2 air spring valve & PLC.
4. Draw the circuit diagram to operate double acting pneumatic cylinder using 5/2 air spring valve & PLC.
5. Draw the circuit diagram to operate double acting hydraulic cylinder using 4/2 direction control valve (solenoid control) using push button switch/latch switch.
6. Draw the circuit diagram to operate double acting hydraulic cylinder using 4/2 direction.
7. Draw the circuit diagram to operate double acting hydraulic cylinder using 4/2 direction control valve (solenoid control) using PLC.
8. Draw the circuit diagram to operate double acting hydraulic cylinder using 4/3 direction control valve (solenoid control) using PLC.
9. Direct Kinematic Analysis of a Robot.
10. Inverse Kinematic Analysis of a Robot.
11. Trajectory planning of a Robot joint in Space scheme.
12. Palletizing Operation using Robot Programming.
13. Robotic programming using SCARA.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (AMS)

ADVANCED MANUFACTURING PROCESSES & METAL CUTTING LAB (Lab - II)

List of Experiments:

1 Study of the morphology of chips produced from different materials sand machining processes.
2 Effect of tool geometry on chip flow direction in simulated orthogonal cutting conditions.
3 Study of cutting ratio/chip thickness ratio in simulated orthogonal cutting with different materials and tool geometry.
4 Evaluations of tool face temperature with thermocouple method.
5 Roughness of machined surface. Influence of tool geometry and feed rate.
6 Extrusion of cylindrical billets through dies of different included angles and exit diameters and their effect on extrusion pressure.
7. Practice and study of blanking and punching process and their characteristic features on mechanical press with existing dies.
8 Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
9 Determination of cutting forces in turning
10 Inspection of parts using tool makers microscope, roughness and form tester
11 Experimental Study of MRR on EDM
12 Experimental Study of TWR on EDM
13 Experimental Study of Surface Roughness on EDM
14 Experimental Study on ECM
15 Experimental Study on 3D Printing

Note: Conduct any Ten exercises from the list given above

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

COMPUTER AIDED MANUFACTURING (Professional Core - III)

UNIT – I:

Computer-Aided Programming: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT – II:

Tooling for CNC Machines: Interchangeable tooling system, preset and qualified toois, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages arid disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding.

UNIT – III:

Post Processors for CNC:

Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP — based- Post Processor: Communication channels and major variables in the DAPP — based Post Processor, th creation of a DAPP — Based Post Processor.

UNIT – IV:

Micro Controllers: Introduction, Hardware components, I/O pins, ports, external memory:, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programming Logic Controllers (PLC' s): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT – V:

Computer Aided Process Planning: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

TEXT BOOKS:

1. Computer Control of Manufacturing Systems / Yoram Koren / McGraw Hill. 1983.
2. Computer Aided Design Manufacturing – K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, PHI, 2008.
3. CAD/CAM Principles and Applications, P.N. Rao, TMH.
4. Alavala, CAD/CAM PHI.

REFERENCES:

1. CAD / CAM / CIM, Radhakrishnan and Subramanian, New Age
2. Principles of Computer Aided Design and Manufacturing, Farid Amirouche, Pearson
3. Computer Numerical Control Concepts and programming, Warren S Seames, Thomson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

MANUFACTURING SYSTEMS: SIMULATION MODELLING AND ANALYSIS
(Professional Core - IV)

Prerequisites: Operations Research, Optimization Techniques and Applications and Probability Statistics

Course Objectives:

- Learn way of analyzing the systems.
- Classification of systems based nature of dynamics and knowledge of elements.
- To develop simulation model for dynamic discrete – event stochastic system.
- To run the model and collect the data.
- To analyze the output data of simulation for specified for performance measures bases on type of simulation and method of output data analysis.

Course Outcomes: At the end of course, student should able to

- Define the state of system W.R.T specified performance measures.
- Identify Dynamic Discrete- event stochastic system.
- Develop simulation model for the said system
- Analyze the model and present the results to specified confidence level.

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 – Framing – strong law of large numbers.

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. Modeling of stochastic input elements – importance – various procedures – theoretical distribution – continuous – discrete – their suitability in modeling.

UNIT - III:
Generation of random variates – factors for selection – methods – inverse transform – composition – convolution – acceptance – rejection – generation of random variables – exponential – uniform – weibull – normal Bernoullie – Binomial – uniform – poison. Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulators – software features – statistical capabilities – G P S S – SIMAN- SIMSCRIPT –Simulation of M/M/1 queue – comparison of simulation languages.

UNIT - IV:
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 Modelling 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 Modelling and SIMNET by Taha H.A., PH, Englewood Cliffs, NJ, 1987.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

MATERIALS TECHNOLOGY (Professional Elective - III)

Prerequisites: Mechanics of solids

Course Outcomes: At the end of the course, the student is able

- To understand on elastic, plastic and fractured behaviour of engineering materials.
- To do appropriate selection of metallic and non-metallic materials for the various engineering applications.

UNIT - I:
Elasticity in metals and polymers, mechanism of plastic deformation, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening. Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity, deformation of non crystalline material

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

UNIT - III:
Fatigue, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and paris Law, Effect of surface and metallurgical parameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure, procedure of failure analysis.

UNIT - IV:
Motivation for selection, cost basis and service requirements, Selection for Mechanical Properties, Strength, Toughness, Fatigue and Creep. Selection for Surface durability, Corrosion and Wear resistance, Relationship between Materials Selection and Processing, Case studies in Materials Selection with relevance to Aero, Auto , Marine, Machinery and Nuclear Applications.

UNIT - V:
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, Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials.
Nonmetallic Materials: Polymeric materials and their molecular structures, Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties and Applications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, $A1_2 O_3$, SiC, Si_3N_4, CBN and Diamond – properties, Processing and applications.

TEXT BOOKS:
1. Mechanical Behavior of Materials/Thomas H. Courtney/ McGraw Hill/2nd 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

QUALITY ENGINEERING IN MANUFACTURING (Professional Elective - III)

UNIT-I:

Quality Value and Engineering: An overall quality system, quality engineering in production design, quality engineering in design of production processes. Loss Function and Quality Level: Derivation and use of quadratile loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances. (N-type, S-type and L-type)

UNIT-II:

Tolerance Design and Tolerancing: Functional limits, tolerance design for N-type. L-type and S-type characteristics, tolerance allocation fbr multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs.

UNIT-III:

Analysis of Variance (ANOVA): NO-way ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

UNIT-IV:

Orthogonal Arrays: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contributor, estimating the mean.

UNIT-V:

ISO-9000 Quality System, BDRE, 6.-sigma, Bench marking, Quality circles Brain Storming — Fishbone diagram — problem analysis.

REFERENCES:

1. Taguchi Techniques for Quality Engineering / Phillip J. Ross / McGraw Hill, Intl. II Edition, 1995
2. Quality Engineering in Production systems **/** G. Taguchi, A. Elsayed et al **/** McGraw Hill Intl. Edition, 1989**.**
3. Taguchi Methods explained: Practical steps to Robust Design **/** Papan P. Bagchi**/** Prentice Hall md. Pvt. Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)
ADVANCED TOOL DESIGN (Professional Elective - III)

Prerequisite: Production Technology

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

- Develop the conceptual design, manufacturing framework and systematic analysis of design problems on the machine tools apply the design procedures for different types of design problems such as gear box design, guide way
- Design, shaft loading and its associated parts, rolling bearings, die design and jigs and fixtures and so on.

UNIT – I:
Tool Materials:
Prosperities of materials: Tools steels, Cast Iron, Mild or low carbon steels, Nonmetallic and nonferrous materials, Heat treating

UNIT – II:
Design of Cutting Tools:
Single Point cutting tools: Milling cutters, Drills, Selection of carbide steels – Determination of shank size for single point carbide tools, Determining the insert thickness for carbide tools

UNIT – III:
Design of Jigs and Fixtures:
Basic principles of location and clamping: Locating methods and devices, Jigs-Definition Types, General considerations in the design of Drill jigs, Drill bushing, Methods of Construction. Fixtures-Vice fixtures, Milling, Boring Lathe Grinding fixtures.

UNIT – IV:
Design of Sheet Metal Blanking and Piercing Dies:
Fundamentals of Die cutting operation, Power press types, General press information, Materials Handling equipment. Cutting action in Punch and die operations. Die clearance, Types of Die construction. Die design fundamentals-Banking and piercing die construction, pilots, stripper and pressure pads presswork material, Strip layout, Short run tooling for piercing.

UNIT – V:
Design of Sheet Metal Bending, Forming and Drawing Dies:
Bending dies, drawing dies, forming dies, drawing operations, Variables that effect metal flow during drawing. Determination of blank size, Drawing force, Single, and double action draw dies.

TEXT BOOKS:

1. Donaldson “Tool Design”/ Tata McGraw Hill
2. Production Technology/HMT/Tata McGraw Hill/

REFERENCES:

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Mechanical Metallurgy/ George F Dieter/ Tata McGraw Hill
3. Machine Tools/C Elanchezhian & M. Vijayan/Anuradha Publications
4. Principles of Machine Tools, Bhattacharya A and Sen. G. C. New Central Book Agency.
5. Hand Book of Metal forming/ Kurt Lange/ Mc Graw-Hill, 1987.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)
TOTAL QUALITY MANAGEMENT (Professional Elective - IV)

Prerequisites: Probability and Statistics, Basics of Industrial Engineering

Course Objectives: The objectives of this course is to introduce the main principles of business and social excellence, to generate knowledge and skills of students to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector.

Course Outcomes: After completing this course, students should be able to:

- To know business excellence models and be able assess organization's performance making reference to their criteria
- To know the principles of total quality management and peculiarities of their implementation
- To be able to use quality management methods analyzing and solving problems of organization
- To know prerequisites of evolution of total quality management and significance of quality gurus' works to the management of modern organizations.
- To Communicate why Total Quality Management (TQM) is fundamental to partnering for mutual benefit.

UNIT-I:

Introduction: The concept of TQM, Quality and Business performance, attitude and involvement of top management, communication, culture and management systems.

Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT-II:

Customer Focus and Satisfaction: Process Vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships.

Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure, pitfalls of bench marketing.

UNIT-III:

Organizing for TQM: The systems approach, Organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools of TQM: Startification, check sheet, Scatter diagram, Ishikawa diagram, paneto diagram; Kepner & Tregoe Methodology.

UNIT-IV:

The Cost of Quality: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

UNIT-V:

ISO 9000: Universal Standards of Quality: ISO around the world, The ISO 9000 ANSI/ASQC Q- 90. Series Standards, benefits of ISO 9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

TEXT BOOKS:

1. Total Quality Management by Joel E. Ross.
2. P.N. Mukherjee, PHI publications.

REFERENCE BOOKS:

1. Beyond TQM by Robert L. Flood
2. Statistical Quality Control by E.L. Grant.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)
CONCURRENT ENGINEERING (Professional Elective - IV)

Prerequisites: Computer-Aided Design
Course objective: To provide a systematic approach to the integrated, concurrent design of products and their related processes, including manufacture and support.

Course Outcomes:

- Understand the need of concurrent engineering and strategic approaches for product design.
- Apply concurrent design principles to product design.
- Design assembly workstation using concepts of simultaneous engineering.
- Design automated fabricated systems – Case studies.

UNIT-I:
Introduction: Extensive definition of CE - CE design methodologies - Organizing for CE - CE tool box collaborative product development
Use Of Information Technology: IT support - Solid modeling - Product data management - Collaborative product commerce - Artificial Intelligence - Expert systems - Software hardware co-design.

UNIT-II:
Design Stage: Life-cycle design of products - opportunity for manufacturing enterprises - modality of Concurrent Engineering Design.
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 - modular - Modeling and reasoning for 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 BOOK:

1. Concurrent Engineering: Automation Tools and Technology by Andrew Kusaik, Wiley John and Sons Inc., 1992.

REFERENCE BOOKS:

1. Integrated Product Development by Anderson MM and Hein, L. Berlin, Springer Verlog, 1987.
2. Design for Concurrent Engineering by Cleetus, J.Concurrent Engineering Research Centre, Morgantown W V, 1992.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

INDUSTRIAL ROBOTICS (Professional Elective - IV)

Prerequisites: Kinematics of machinery

Course Objectives:

- To demonstrate knowledge of different types of actuators used in robotic systems.
- To analyze the position and velocity kinematics of a robot arm, implement in 2D.
- To analyze the dynamics of a robot arm, implement in 2D.
- To analyze sensor signals to implement real-time control algorithms.
- To demonstrate knowledge of error propagation in electrical, mechanical and computational systems.
- To construct, program, and test the operation of a robotic system to perform a specified task.

Course Outcomes: After doing this course, the student should be able to,

- Understand the evolution, classification, structures and drives for robots.
- Teach the students about the kinematic arrangement of robots and its applications in the area of manufacturing sectors.
- Expose the students to build a robot for any type of application.

UNIT-I:

Introduction: Automation and Robotics, Robot anatomy configuration, motions joint motion and notatioin, work volume, robot drive system, control system and dynamic performance, precision of movement.

Control System and Components: basic concept and modals controllers control system analysis, robot actuators and feedback components (sensors): Internal & External Sensors, Positions sensors, velocity sensors - Desirable features, tactile, proximity and range sensors, uses sensors in robotics, Power Transmission Systems.

UNIT-II:

Motion Analysis and Control: Manipulator kinematics, position representation Homogeneous transformation, D-H Notation, D-H Transformation Matrix, Forward & Inverse transformations, problems on planar & spatial manipulators, Differential Kinematics, Jacobian Formulation, problems, manipulator path control: Slew, Joint Interpolated & Straight line motions, trajectory planning: Joint space scheme, Cartesian space scheme, Cubic Polynomial fit without and with via point, blending.

UNIT-III:

Robot Dynamics: Lagrange – Euler & Newton - Euler formulations, problems on two link planar manipulators, configuration of robot controller.

End Effectors: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design.

Machine Vision: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, Image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNIT-IV:

Robot Programming: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SINGNAL AND DELAY commands, Branching capabilities and Limitations.

Robot Languages: Textual robot languages, Generation, Robot language structures, Elements and functions.

UNIT-V:

Robot Cell Design and Control: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Robot Applications: Material transfer, Machine loading/unloading. Processing operations, Assembly and Inspection, Future Applications.

TEXT BOOKS:

1. Introduction to Robotics Mechanics & Control by John J. Craig, Pearson
2. Industrial robotics by Mikell P. Groover, McGraw Hill.

REFERENCE BOOKS:

1. Industrial robotics by Mikell P. Groover, McGraw Hill
2. Robotics by K.S. Fu, McGraw Hill.
3. Introduction to Robotics Mechanics & Control by John J. Craig, Pearson
4. Robot Analysis by Lung Wen Tsai, John Wiley & Sons
5. Robot Analysis and Control by Asada H. and J. E. Slotin, Wiley, New York

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

ADVANCED CAD/CAM LAB (Lab – III)

Features and selection of CNC turning and milling centres. Practice in part programming and operation of CNC turning machines, subroutine techniques and use of cycles. Practice in part programming and operating a machining centre, tool planning and selection of sequences of operations, tool setting on machine, practice in APT based NC programming.

Geometric Modelling of 2D & 3D objects by using any CAD packages.

Analysis of Objects by using any Analysis packages.

CAD Package References:
AUTO CAD
PROEE
CATIA V5
UNIGRAPHICS
IRON CAD

ANALYSIS Package References:

ANSYS
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 performance evaluation
3) Machines, AGVs and AS/RS integrated problems
4) JIT system
5) Kanban flow
6) Material handling systems
7) M.R.P. Problems
8) Shop floor scheduling etc.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (AMS)

SIMULATION OF MANUFACTURING SYSTEMS LAB (Lab – IV)

A. MANUFACTURING SIMULATION

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

1. Auto MOD Software.
2. PROMODEL
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 modelling and simulation experiments:

1. AGV planning
2. ASRS simulation and performance evaluation
3. Machines, AGVs and AS/RS integrated problems
4. JIT system
5. Kanban flow
6. Material handling systems
7. M.R.P. Problems
8. Shop floor scheduling etc.

B. PRECISION ENGINEERING

1. Hydraulic and Pneumatic circuits
2. Closed loop control systems
3. Study of the chip formation in turning process
4. Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
5. Determination of cutting forces in turning
6. Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasma spraying
7. Inspection of parts using tool makers microscope, roughness and form tester
8. Study of micro-controllers, programming on various CNC machine tools and also controllers
9. Studies on PLC programming
10. Study and programming of robots
11. Condition monitoring in machining process using acoustic emission.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (AMS)

PRODUCTION AND OPERATIONS MANAGEMENT (Professional Elective - V)

Prerequisites: Operations Research, Production Planning and Control

Course Outcomes: At the end of the course, the student is able to

- Understand the importance of production and operations management, for getting the
- Competitive edge
- Do value analysis for a given product and design the plant layout for the specified production system.
- Do Aggregate planning, MRP Work study, and scheduling
- Able to apply the project management techniques

UNIT- I:

Overview of Production & Operations Management (POM): Introduction-Definition-Importance-Historical Development of POM-POM scenario today

Product & Process design: Role of product development- Product development process-Tools for efficient product development (briefly) - Determination of process characteristics- Types of processes and operations systems- Continuous –Intermittent-Technology issues in process design- Flexible Manufacturing Systems- Automated Material Handling Systems

UNIT –II:

Value Analysis: Definition-Objectives-Types of Values-Phases- Tools -FAST diagram-Steps-Advantages-Matrix method-Steps.

Plant Location & Plant layout: Factors affecting locations decisions-Location planning methods-Location factor rating -Centre of Gravity method-Load distance method. Plant layout- Definition-Objectives-Types of layouts-Design of product layout-Line balance-Terminology-RPW method.

UNIT- III:

Aggregate Planning: Definition- Objectives-Basic strategies for aggregate production planning-Aggregate production planning method-Transportation model- Master Production Scheduling.

Material Requirement Planning: Terminology-Logic-Lot sizing methods-Advantages & Limitations

UNIT – IV:

Work Study: Work study: method study –definition-objectives-steps-Charts used- Work measurement-Time study- Definition-steps- Determination of standard time- Performance rating-Allowances. Work sampling- steps- comparison with time study.

Quality Management: Economics of quality assurance-Control charts for variables and for attributes –Acceptance sampling plans-Total Quality Management-ISO 9000 series standards-Six sigma

UNIT – V:

Scheduling: Need-basis for scheduling- Scheduling rules- Flow shop & Job shop scheduling. Line of Balance. **Project management:** PERT- Critical path determination- Probability of completing project in a given time- CPM- Types of floats- Critical path determination- Crashing of simple networks-Optimum project schedule.

TEXT BOOKS:

1. Operations Management for Competitive Advantages- Chase Aquinano-TMH, 2009
2. Operations Management: Theory and Practice: B.Mahadevan Pearson.
3. Industrial Engineering and Mangement: Dr.Ravi Shankar- Galgotia.

REFERENCES:

1. Modern Production and Operations Managemet: Buffa, Wiley
2. Theory and Problems in Production and Operations Managemet:SN Chary TMH.
3. Operations Management 8e Process and Value Chains: Lee Krajewskiet. all Pearson

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (AMS)

MEMS (Professional Elective - V)

Prerequisites: Electronic Circuits, Basic knowledge in material science

Course Objectives:

- To make students to gain basic knowledge on overview of MEMS (Micro electro Mechanical System) and various fabrication techniques.
- To design, analysis, fabrication and testing the MEMS based components.
- To introduce the students various opportunities in the emerging field of MEMS.
-

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

- Synthesize and characterize nanomaterials for engineering applications
- Design and analyze methods and tools for micro and nano manufacturing.
- Improve the quality of MEMS by analyzing the variables of the underlying micro and nano manufacturing method
- Select appropriate industrially-viable process, equipment and tools for a specific product.

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 Matter and Intermolecular Forces, 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, Thermomechanics, 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 Micro 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 Mechanical Design, 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 Piezo resistors, 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. Tia-Ran Hsu, MEMS & Microsystems. Design & Manufacturing, TMH 2002
2. Foundation of MEMS/ Chang Liu/Pearson, 2012

REFERENCE BOOKS:

1. An Introduction to Microelectromechanical Systems Engineering by Maluf M., Artech House, Boston 2000
2. Micro robots and Micromechanical Systems by Trimmer, W.S.N., Sensors & Actuators, Vol 19, 1989.
3. Applied Partial Differential Equations by Trim, D.W., PWS-Kent Publishing, Boston, 1990.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (AMS)

FLEXIBLE MANUFACTURING SYSTEMS (Professional Elective - V)

Prerequisites: Machine Tools, Basics of Industrial Engineering

Course Objectives:

- To Understand the role of Flexible Manufacturing Systems (FMS) in manufacturing
- To Understand the concept of Group Technology
- To Understand the concept of Cellular Mfg Systems
- To Understand the benefits of automation
- To Know types of manufacturing industries
- To have a basic knowledge of automation equipment
- To Understand logic control and associated technologies

Course Outcomes: At the end of the course, the student shall be able to:

- Develop FMS using the most appropriate technique.
- Implement FMS concept in a manufacturing environment
- Use various types of sensors and actuators in PLC implementations
- Explain the role of automation in manufacturing
- Tell the difference between Group Technology and Cellular Manufacturing
- Classify automation equipment and assembly systems into different categories.

UNIT-I:
Understanding of FMS: Evolution of Manufacturing Systems, Definition, objective and Need, Components, Merits, Demerits and Applications Flexibility in Pull and Push type

UNIT-II:
Classification of FMS Layout: Layouts and their Salient features, Single line, dual line, loop, ladder, robot centre type etc.

UNIT-III:
Processing stations: Salient features Machining Centers, Turning centre, Coordinate measuring machine (CMM), Washing/Deburring station

UNIT-IV:
Material Handling System: An introduction, Conveyor, Robots, Automated Guided Vehicle (AGV), Automated Storage Retrieval System (ASRS) Management technology: Tool Management, tool magazine, Tool preset, identification, Tool monitoring and fault detection, routing, Production Planning and Control, Scheduling and loading of FMS

UNIT-V:
Design of FMS: Performance Evaluation of FMS, Analytical model and Simulation model of FMS Case studies: Typical FMS problems from research papers

TEXT BOOKS:

1. Flexible Manufacturing Cells and System by William W Luggen, Prentice Hall of Inc New Jersey, 1991
2. Flexible Manufacturing system by Reza A Maleki, Prentice Hall of Inc New Jersey, 1991
3. Flexible Manufacturing by John E Lenz, marcel Dekker Inc New York ,1989.

REFERENCE BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing by Groover, M.P, Prentice Hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

Prerequisite: None

Course objectives: Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

UNIT-I:
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II:
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT-III:
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:
key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

UNIT-V:
skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT-VI:
useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS/ REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

DISASTER MANAGEMENT (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countries they work in

UNIT-I:
Introduction:
Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT-II:
Repercussions Of Disasters And Hazards:
Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT-III:
Disaster Prone Areas In India:
Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

UNIT-IV:
Disaster Preparedness And Management:
Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V:
Risk Assessment Disaster Risk:
Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

UNIT-VI:
Disaster Mitigation:
Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

TEXT BOOKS/ REFERENCES:

1. R. Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “’New Royal book Company.
2. Sahni, Pardeep Et.Al. (Eds.),” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies” ,Deep &Deep Publication Pvt. Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes: Students will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

UNIT-I:
Alphabets in Sanskrit,

UNIT-II:
Past/Present/Future Tense, Simple Sentences

UNIT-III:
Order, Introduction of roots,

UNIT-IV:
Technical information about Sanskrit Literature

UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

VALUE EDUCATION (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:
Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

UNIT-II:
Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT-III:
Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:
Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT-V:
Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TEXT BOOKS/ REFERENCES:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

CONSTITUTION OF INDIA (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I:
History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)

UNIT-II:
Philosophy of the Indian Constitution: Preamble**,** Salient Features

UNIT-III:
Contours of Constitutional Rights & Duties: Fundamental Rights Right to Equality**,** Right to Freedom**,** Right against Exploitation**,** Right to Freedom of Religion**,** Cultural and Educational Rights**,** Right to Constitutional Remedies, Directive Principles of State Policy**,** Fundamental Duties.

UNIT-IV:
Organs of Governance: Parliament**,** Composition**,** Qualifications and Disqualifications**,** Powers and Functions**,** Executive**,** President**,** Governor**,** Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions

UNIT-V:
Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-VI:

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS/ REFERENCES:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

PEDAGOGY STUDIES (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes: Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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 indepth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. 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.

TEXT BOOKS/ REFERENCES:

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 of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

STRESS MANAGEMENT BY YOGA (Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes: Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:
Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:
Yam and Niyam.

UNIT-III:
Do`s and Don't's in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:
Asan and Pranayam

UNIT-V:
i) Various yog poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:

1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (AMS)

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes: Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT-I:

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-IV:

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.