

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. (INDUSTRIAL ENGINEERING AND MANAGEMENT)
EFFECTIVE FROM ACADEMIC YEAR 2022-23 ADMITTED BATCH

R22 COURSE STRUCTURE AND SYLLABUS

I Year I Semester

Course Code	Course Title	L	T	P	Credits
Professional Core-I	Industrial Engineering & Management	3	0	0	3
Professional Core-II	Statistical Quality Control	3	0	0	3
Professional Elective - I	1. Optimization Techniques & Applications 2. Materials Management	3	0	0	3
Professional Elective - II	1. Plant Maintenance and Reliability Engineering 2. Industrial Robotics	3	0	0	3
	Research Methodology & IPR	2	0	0	2
Lab - I	Industrial Engineering Practices Lab	0	0	4	2
Lab - II	Statistical Quality Control System 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	Manufacturing Systems: Simulation Modelling and Analysis	3	0	0	3
Professional Core - IV	Supply Chain Management	3	0	0	3
Professional Elective - III	1. Total Quality Management 2. Enterprise Resource Planning 3. Artificial Intelligence in Manufacturing	3	0	0	3
Professional Elective - IV	1. Marketing Management 2. Energy Management 3. IoT & Industry 4.0	3	0	0	3
	Mini Project with Seminar	0	0	4	2
Lab - III	Simulation of Manufacturing Systems Lab	0	0	4	2
Lab - IV	Supply Chain Management Lab	0	0	4	2
Audit - II	Audit Course - II	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. Product data Management 2. Financial Management	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, please refer 7.10 in R22 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

Open Electives:

1. Business Analytics
2. Waste to Energy
3. E- Commerce Management & Digital Communication
4. Industrial Safety

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

INDUSTRIAL ENGINEERING MANAGEMENT (Professional Core - I)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the concept of management and organizational structure.
2. To gain knowledge on work-study and allowances in work management.
3. To understand workplace designs.
4. To acquire knowledge of job evaluation and various wage schemes.
5. To estimate the cost of production in various manufacturing processes.

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

- 1: Make managerial decisions for effective business administration.
- 2: Explore various methods of work study and evaluate standard time.
- 3: Design various types of workspaces.
- 4: Explain and implement various job evaluation methods.
- 5: Evaluate the overall cost of production for a product.

UNIT - I

Introduction to Management concept & Organizational Structures

Concept of Management and organization - functions of management - Taylor's scientific management, Fayol's principles of management, Douglas Mc-Gregor's Theory X and Theory Y, Maslow's Hierarchy of Human Needs – Mintzberg's Managerial Roles Approach – Mc.Kensey's 7'S Framework

Organizational Structure – Departmentation – Line and Staff Structure – Span of Management – Matrix Structure, Boundaryless Organization, Virtual Organization.

UNIT- II

WORK STUDY: Introduction – definition – objectives – steps in work study Methodstudy – definition – objectives, steps of method study, Outline process charts and Flow process charts.

Work Measurement – purpose – types of study – stop watch methods – steps – key rating – allowances – standard time calculations – work sampling.

UNIT- III

WORK PLACE DESIGN: Anthropometry. Structural body dimensions, use of anthropometry data, work space dimensions – work space for personal when seated – minimum requirement for restricted spaces work surfaces, work surfaces when seated, standing science of seating, principles of seat design.

Nature of Man – Machine system – Fundamental man – Machine system assumptions – types of Systems – Data base if human factors – Human performance – types of human error in system tasks – task data –empirical task data – Judgmental task data.

UNIT- IV

Visual displays – Process of seeing – types of visual activity – conditions that affect visual discriminations – Quantitative visual display – Basic design of dynamic quantitative displays, Quantitative visual display – Strategy indicators – signal and warninglights.

Job design – job evaluation – methods of job evaluation – simple routing objective systems – classification method – factor comparison method – point method – benefits of job evaluation and limitations.

Merit rating – job evaluation Vs merit rating – objectives of merit rating – method for merit rating – ranking method – paid company method – checklist method.

Wage incentive scheme – wages – objectives of a good wage incentive plan – basis of good wage – incentive plan – plan- types of wage – incentive plans – time method – straight piece rate method – differential piece rate method – Hasley premium plan – Emerson efficiency plan – Bedeaux point plan.

UNIT- V

ESTIMATING AND COSTING, ESTIMATION: Importance – Aims – functions – Qualities of estimator, Cost – definition Aims standard cost – difference between estimating and costing – costing methods – elements of costs – mensuration. Estimating of material cost & Overheads – machine shop – sheet metal shop – forging – welding Shop-Selling Price calculations.

REFERENCE BOOKS:

1. Motion and time Study / Ralph M Barnes/ John Willey & Sons.
2. Works Study / Ilo
3. Human factors in Engineering & Design / Ernest J Mc Cormick/TMH
4. Production Operation management / Paneer Selvam/PH1
5. Industrial Engineering Management / Ravi Shankar/Galgotia
6. Mechanical Estimating Costing / T. T Banga & S.C Sharma/Khanna Publishers
7. Industrial Engineering Hand Book/ Maynard.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
STATISTICAL QUALITY CONTROL (Professional Core - II)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the concept of underlying statistical quality control.
2. To acquire knowledge of various process control methods.
3. To understand various charts for control limits.
4. To gain knowledge on the establishment of tolerances and limits.
5. To understand various sampling methods.

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

1. Difference between quality control and inspection.
2. Make various charts for process control.
3. Implement various types of chart attributes.
4. Explain various methods of establishing tolerance limits.
5. Explain and apply various sampling methods.

UNIT – I:

Quality – definition, difference between quality control and inspection, variable, attribute, assignable and non-assignable causes.

Description of patterns of variation, averages, measures of dispersion, sampling statistics, universe parameters, normal curves, theory of probability, random variables, their distributions, standard distributions, binomial hyper geometry, estimator, properties of estimator, estimate, point estimate, confidence interval, limits.

UNIT – II:

X and R Charts, necessary steps, decisions preparatory to charts, making and recording, trial control limits calculations drawings of preliminary conclusions, relations between processes out of control and specifications limits use of charts, process capability, definition in analysis of process capability, sources of variability.

UNIT – III:

Charts for fraction rejected need for charts for attributes, control limits for the P chart, necessary steps, decision preparation to control, decision on the selection of sub groups, choice between charts P and Chart for NP interpretation of lack of causes, reports and action, sensitivity of P charts.

UNIT – IV:

Control charts for non-conformities, conditions favorable, control limits for C and U charts, U charts for non-conformities. Aspects of specification and tolerance, purpose and content, design and inspection, statistical methods setting better specification limit, establishment of tolerance limit by pilot runs, two statistical theorems precisions.

UNIT – V:

Acceptance sampling, need concept, economics, symbols and terminology, formation of lot for acceptance, lot-by-lot Don roaming system for lot by lot, acceptance sampling by attributes. An AQL system for lot by-lot acceptance, sampling by attributes, selection of acceptance sampling system, determining the sample size code letter, probability of acceptance of lot having AQL percent defective, O.C. curves under normal, tightened and reduced inspections, calculating probability of switching N.T.N.

REFERENCE BOOKS:

1. Statistical Quality Control / Shewart
2. Statistical Quality Control / E. L. Grant / McGraw – Hill.
3. Statistical Quality Control/ M. Mahajan / Dhanpat Rai & Co.
4. Statistical Quality Control / Douglas.C Montgomery / Wiley / 2012.
5. Statistical Quality Control / M. Jeya Chandra / CRC Press / 2010.
6. Statistical Quality Control / Richad S. Leavenworth / Tata McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
OPTIMIZATION TECHNIQUES AND APPLICATIONS (Professional Elective - I)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand advanced optimization models and solution methods for technical problems.
2. To understand various methods of single and multi-variable non-linear optimization.
3. To understand various decision processes.
4. To gain knowledge of linear programming.
5. To understand various programming methods.

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

1. Apply appropriate optimization techniques and solve for single variable
2. Apply appropriate optimization techniques and solve for multivariables.
3. Solve problems related to Geometric programming and Dynamic Programming.
4. Formulate and solve LPP.
5. Apply chance constrained algorithm and solve stochastic linear programme.

UNIT- I:

Single Variable Non-Linear Unconstrained Optimization: One dimensional Optimization methods: Uni-modal function, elimination method, Fibonacci method, golden section method, interpolation methods- quadratic & cubic interpolation methods.

UNIT – II:

Multi Variable Non-Linear Unconstrained Optimization: Direct search method – Univariate Method – pattern search methods – Powell's – Hook – Jeeves, Rosenbrock search methods – gradient methods, gradient of function, steepest decent method, Fletcher reeves method. Variable metric method.

UNIT – III:

Geometric Programming: Polynomials – arithmetic – geometric inequality – unconstrained G.P – constrained G.P

Dynamic Programming: Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory. Allocation, scheduling replacement.

UNIT IV:

Linear Programming: formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.

Simulation – Introduction – Types – Steps – application – inventory – queuing – thermal system.

UNIT V:

Integer Programming: Introduction – formulation – Gomory 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, dynamic programming.

REFERENCE BOOKS:

1. Optimization theory & Applications/ S.S Rao/ New Age International
2. Introductory to operation research/Kasan & Kumar/Springer

3. Optimization Techniques theory and practice / M.C Joshi, K.M Moudgalya/ Narosa Publications.
4. Operation Research/H.A. Taha/TMH
5. Optimization in operations research/R.L Rardin
6. Optimization Techniques/Benugundu & Chandraputla/Person Asia.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
MATERIALS MANAGEMENT (Professional Elective - I)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand integrated material management.
2. To acquire knowledge on various inventory management.
3. To understand inventory control systems.
4. To gain knowledge of various types of store management.
5. To acquire knowledge on principles of material handling.

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

1. explain importance of material management and purchasing.
2. Identify various Inventory Management.
3. Evaluate inventory control systems.
4. Explain Stores management.
5. Explain the Material handling process in production.

UNIT- I:

Introduction to Integrated Materials Management - need, scope, functions, objectives, and Importance of Materials Management, Purchasing function - Objectives and scope of purchasing - purchase budget and materials budget - purchase order cycle - Source selection and development - Negotiations In purchasing - public buying - Just in Time concept.

UNIT – II:

Imports - Import trade control, foreign trade (Development and Regulations) Act and Rules -Import Procedures - Importation cycle, Inventory Management- Functions - Associated Coats - Classification – ABC VED - FSN analysis - Basic BOQ model.

UNIT –III:

Inventory control systems - Periodic Review - P system and Continuous review systems – Q systems - Lead-time analysis - Reorder point level Calculations, MRP - Introduction - Terminology - Types of demand input to the MRP -Working Principle of MRP - Output of MRP - advantages and disadvantages.

UNIT-IV:

Stores Management- Stores function - types of stores - storage procedures- stock Verification and stock accounting - stores records - Disposal of Surplus, scrap, reclamation and salvage of materials.

UNIT-V:

MATERIAL HANDLING: layout, selection of equipment, principles of materials handling - Packaging, types of material handling equipment.

REFERENCE BOOKS:

1. Purchasing and Materials Management/ P Gopalakrisnan / TMH
2. Industrial Engineer in g and Management/ Ravi Shankar / Galgotia Publications / 2003
3. Production & Operations Management/ Chase / Mc Graw Hill
4. Purchasing and Materials Management/ Lamar Lee & Donald W. Dobler / McGraw Hill
5. Materials Management / Chittle A. K / PHI Learning

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
PLANT MAINTENANCE AND RELIABILITY ENGINEERING (Professional Elective - II)

L	T	P	C
3	0	0	3

Course objectives:

- The objective of plant maintenance and Reliability Engineering is to achieve minimum breakdown and to keep the plant in good working condition at the lowest possible cost.
- Machines and other facilities should be kept in such a condition which permits them to be used at their optimum (profit making) capacity without any interruption or hindrance.
- Maintenance division of the factory ensures the availability of the machines, buildings and services required by other sections of the factory for the performance.
- Their functions at optimum return on investment whether this investment be in material, machinery or personnel.
- Functions and their role to enhance the plant reliability and improve the availability of the machine components.

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

- Understand and describe various aspects of the plant maintenance.
- Realise the importance of maintenance and reliability.
- Analyse the various types of maintenance and their adoptability.
- Understand the concepts of reliability engineering and its role in plant performance.
- Understand reliability, availability and maintainability.

UNIT - I:

Introduction, Need for Maintainability, Maintenance, and Reliability, History, Maintenance, Reliability, Maintenance, and Reliability Terms and Definitions, Useful Information on Maintainability, Maintenance, and Reliability, Problems.

UNIT - II:

Maintenance and Reliability Mathematics, types of maintenance, adoptability and performance aspects, Reliability centred maintenance, predicted and preventive maintenance. Availability Maintainability and Reliability functions.

UNIT - III:

Functions and their usage in maintenance and reliability. Weibull distribution, normal distribution beta distribution and calculations to improve plant performance. Bath tub curve, stages of life and suitable maintenance.

UNIT - IV:

Reliability Availability and Maintainability calculations, TBF, TTR, CTBF, CTTR, OTBF, OTTR. Trend analysis, Homogenous and non-homogeneous distribution. Calculations – plant reliability and adoption of maintenance.

UNIT - V:

PEXE method, alpha and beta functions, KLM method, MLE method and calculations involving Weibull parameters for enhancing the components of plant and adopting suitable maintenance policies.

TEXT BOOKS:

1. Plant Maintenance and Reliability Engineering, B.S. Dhillon, © 2006 by Taylor & Francis Group, LLC

2. Maintenance Replacement and Reliability, Theory and Applications, 2nd Edition, Andrew K S Jardine, Albert H C Tsang, CRC Press

REFERENCE BOOKS:

1. Wild, R., Essentials of Plant Maintenance and Reliability Engineering, Holt, Rinehart and Winston, London, 1985.
2. Kales, P., Reliability and Maintenance, Prentice Hall, Inc., Upper Saddle River, NJ, 1998.
3. Dhillon, B.S., Plant Reliability and Maintenance, Springer Verlag, New York, 1991.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
INDUSTRIAL ROBOTICS (Professional Elective - II)

L	T	P	C
3	0	0	3

Prerequisites: Kinematics of machinery

Course Objectives:

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

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

1. Classify different control schemes and identify applications of sensors in robotics
2. Analyze Differential Kinematics.
3. Explain image processing in robot vision system and types of robot programming languages.
4. Execute robot programming as a path in space and motion.
5. Design a robot work cell layout and discuss applications of robot systems.

UNIT - I:

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

Control System and Components: basic concept and modal 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, SIGNAL 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 I Sem. (IEM)
RESEARCH METHODOLOGY AND IPR

L	T	P	C
2	0	0	2

Prerequisite: None

Course Objectives:

1. To understand the research problem
2. To know the literature studies, plagiarism and ethics
3. To get the knowledge about technical writing
4. To analyze the nature of intellectual property rights and new developments
5. To know the patent rights

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

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. 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.
6. 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"

REFERENCE BOOKS:

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. (IEM)
INDUSTRIAL ENGINEERING PRACTICES LAB (Lab - I)

L	T	P	C
0	0	4	2

List of Experiments:

1. Design of initial layout by using ALDEP
2. Development of existing layout by using CRAFT & CORLEP
3. Conducting of Method study
4. Conducting of Time study
5. Conducting of Work Sampling
6. Study of assembly process
7. Micro motion studies
8. Ergonomics studies – Measurement of oxygen level & measurement of stress distribution in body
9. Design of Visual system
10. Design of Audio system
11. Office Seat & car seat design
12. Bear game for driving supply chain concepts
13. Computation of wage incentive schemes
14. SAP/ABAP fundamentals – Manufacturing system & Inventory system
15. ERP
16. Computation of sales forecasting techniques and validation
17. Computation of lot sizing methods used in MRP
18. Development of Bill of Materials for MRP (product structure – development of mother, children & brother relationship development) Using the LINGDO package for solving of L.P. models

Note: Any 10 experiments may be performed from the above listed experiments.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year I Sem. (IEM)
STATISTICAL QUALITY CONTROL SYSTEM LAB (Lab - II)

L	T	P	C
0	0	4	2

List of Experiments:

1. Construction of X and R charts
2. Construction of P Chart
3. Construction of C Chart
4. Construction of NC Chart
5. Construction of Single Sampling Plan, given $N = 1000$, $n = 10$ and $c = 2$.
6. Construction of Double Sampling plan, given $N = 1000$, $n_1 = 100$, $c_1 = 0$, $n_2 = 50$, $c_2 = 2$.
7. Construction of Single sampling plan and Double Sampling plan for specified design and find out customer risk and producer risk.
8. Drawing of Quality Control
9. Drawing of Cause and Effect (Fish Bone) diagram.
10. Drawing Pareto diagram.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
MANUFACTURING SYSTEMS: SIMULATION MODELLING AND ANALYSIS
(Professional Core - III)

L	T	P	C
3	0	0	3

Course Objectives:

1. Define the basics of simulation modeling and replicating the practical situations in organizations
2. Explain Verification and Validation of simulation model.
3. Generate random numbers and random variates using different techniques.
4. Analysis of various simulation languages.
5. Analysis of Simulation models using input analyzer, and output analyzer

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

1. Analyze various kinds of simulation models.
2. Build simulation models and stochastic input elements.
3. Generate random variates and variables.
4. Differentiate between Simulation languages and Simulation
5. Interpret the model and apply the results to resolve critical issues in a real-world environment.

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 – type I & II 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 – welbull – normal Bernoulli – Binomial – uniform – Poisson.

UNIT - IV:

Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulations – software features – statistical capabilities – GPSS – SIMAN – SIMSCRIPT – Simulation of M/M/1 queue – comparison of simulation languages.

UNIT - V:

Output data analysis – Types of Simulation w.r.t output data analysis – warm up period – Welch algorithm – Approaches for Steady – Stage Analysis – replication - - Batch means methods – comparisons.

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

REFERENCE BOOKS:

1. Simulation Modeling and Analysis, law A.M & Kelton McGraw Hill 2nd Edition. New York 1991.

2. Discrete Event System Simulation Banks J& Carson JS PH Englewood Cliffs, NJ 1984.
3. Simulation of Manufacturing Systems, by Carrie a Wiley NY 1990.
4. A Course in Simulation Ross SM Mc Millan NY 1990.
5. Simulation Modeling and SIMNET, Taha HA PH Englewood Cliffs NJ 1987.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
SUPPLY CHAIN MANAGEMENT (Professional Core - IV)

L	T	P	C
3	0	0	3

Course Objectives:

1. To analyze various Logistics and Competitive strategies.
2. To list and explain various Logistics systems designs and their costs and performance.
3. To analyze the Logistics and Supply chain relationship.
4. Analysis of technology used in Supply chain.
5. To develop an understanding of managing global logistics and global supply chains.

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

1. Analyze various kinds of models in logistic Management.
2. Understand the concept of total cost analysis.
3. Execute mapping of supply chain processes.
4. To explain coordination in supply chain and internal supply chain management.
5. Understand global supply chain business processes.

UNIT - I:

Logistics and Competitive Strategy – Competitive – advantage – Gaining Competitive Advantage through logistic – The Mission of Logistics Management – Integrated supply chains – Supply Chain and Competitive performance – The changing logistics environment – Models in Logistics Management – Logistics to supply Chain Management – Focus areas in supply Chain Management – performance Measures for SCM.

Customer Service Dimension – The marketing and logistics interface – Customer service and customer retention – Service - driven logistics systems – Basic service capability – Increasing customer expectations – Value added services – Customer satisfaction and success – Time based logistics – Case studies.

UNIT - II:

Logistics Systems Design: Logistics positioning - Logistics reengineering – reengineering procedure – logistics environmental assessment – time based logistics – alternative logistics strategies – strategic integration – logistics time based control techniques.

Measuring Logistics Costs and Performance: The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom line – Impact of Logistics on Shareholder value – customer profitability analysis – direct product profitability – cost driver and activity – based costing.

UNIT - III:

Logistics and Supply chain relationship: Benchmarking the logistics process and SCM operation – Mapping the supply chain processes – Supplier and distributor benchmarking - setting benchmarking priorities – identifying logistics performance indicators – Channel structures – Economics of distribution – channel relationship – logistic service alliances.

Sourcing transporting and pricing products: Sourcing decisions in supply chain – transportation in the supply chain – transportation infrastructure – supplier of transport services – basic transportation economics and pricing – transportation documentation – pricing and revenue management in the supply chain – Coordination in the supply chain – pricing and revenue management in supply chains.

UNIT - IV:

Coordination and Technology in Supply chain: Lack of coordination and Bullwhip Effect – Impact of lack of coordination – obstacle to coordination – managerial levers to achieve coordination – Building strategic partners and trust within a supply chain. Role of IT in the supply chain – Customer Relationship

Management – Internal supply chain management – Supply chain IT in practice – Information technology and the supply chain – E – business and the supply chain – E-business Framework – case studies.

UNIT - V:

Managing global logistics and global supply chains: Logistics in a global economy – views of global logistics – global operation levels – interlink global economy- The global supply chains – Global supply chain business processes – Global strategy – Global purchasing – Global logistics – Channel in Global logistics – Global alliances – Issues and Challenges in Global supply chain Management – case studies.

REFERENCE BOOKS:

1. Donald J. Bowersox and David J Closs. Logistical Management; The Integrated Supply Chain Process, TMH 2003.
2. Martin Christopher Logistics Supply Chain Management, Pitman London 1993.
3. Sunil Chopra and Peter Meindl: supply Chain Management: Strategy, Planning and Operation 2/e Pearson Education New Delhi 2002.
4. B. S Sahay supply chain Management for Global competitiveness Macmillan New Delhi 2003.
5. Phillip B. Schary Tage Skhott – Larsen: Managing the Global Supply Chain Viva Mumbai 2000.
6. Arjun J Van Weele: Purchasing and Supply Chain Management – Analysis, Planning and Practice 2/e Thomson Learning 2000.
7. Ballou, Business Logistics / Supply chain management 5/e Pearson Education

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

L	T	P	C
3	0	0	3

Course Objectives:

1. Develop an understanding of the necessary information and skills needed to manage, control and improve quality practices in the organizations through TQM philosophy.
2. To understand customer and supplier relationship and Bench marketing.
3. Apply TQM in traditional organizations.
4. Analysis of quality in cost and management.
5. To understand various ISO around the world.

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

1. Understand the concept of TQM and various control charts.
2. To analyze the relationship between customer and supplier.
3. Implement TQM in an organization.
4. To evaluate the cost of quality.
5. Understand the third party audit and documentation of various ISO.

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 Marketing: Evolution of Bench Marketing, meaning of Bench marketing, benefits of bench marketing, the bench marketing process, 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 organizing, Quality Circles. Productivity, Quality and Reengineering: The leverage of Productivity and Quality, Management systems Vs. Technology, Measuring Productivity, Improving Productivity Re-engineering.

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:

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

REFERENCE BOOKS:

1. Total Quality Management - Joel E. Ross.
2. Beyond TQM - Robert L. Flood.
3. Statistical Quality Control - E. L. Grant.

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

ENTERPRISE RESOURCE PLANNING (Professional Elective – III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning
2. To enable the students in knowing the Advantages of ERP
3. To train the students to develop the basic understanding of how ERP enriches the Business organizations in achieving a multidimensional growth.
4. Impart knowledge about the historical background of BPR
5. To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the higher technical skills.

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

1. Understand and apply the concept of ERP and BRP
2. Explain the challenges associated with ERP System
3. To evaluate project evaluation.
4. Explain the challenges associated with implementing an ERP system
5. Understand the application of ERP in real-life problems.

UNIT – I:

Introduction to ERP: Overview of ERP – Introduction and Evaluation of ERP Reason for the growth of the ERP – Market, Advantages and Disadvantages of ERP, Overview of Enterprise – Integrated Management Systems, Business Modelling Integrated Data Model.

ERP and Related Technologies : Business Process Reengineering (BRP) – Best Practices in ERP, Re-engineering Options-Clean state Re-engineering, Technology Enabled Re-engineering, Business Intelligence Systems – Data Mining, Data Warehousing Online Analysis Processing (OLAP), Supply Chain Management.

UNIT – II:

Benefits of ERP: Reduction of Lead Time, On-Time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better customer Satisfaction, Improved Information Accuracy and Design Making Capabilities (Case Studies).

UNIT – III:

ERP System Options and Selection Methods: Optimal Means of Developing an ERP Measurement of Project Impact, IT Selection and Project Approval, ERP proposal Evaluation, Project Evaluation Techniques, Testing.

UNIT –IV:

ERP Implementation and Maintenance: Implementation Strategy option, Features of Successful ERP Implementation and Strategy to Attain Success, User Training ERP Maintenance.

ERP The Business Modules: Introduction: Finance, Manufacturing (Production) Human Resource, Plant Maintenance, Materials Management, quality Management Sails and Distribution.

UNIT-V:

ERP – The Market: Introduction to ERP Market – SAP AG People Soft, Baan Company Oracle Corporation, JD Edwards World Solution Company, QAID System Software Associates Inc (SSA) – case studies

Future Directions in ERP: Introduction – New Markets New technologies, Faster Implementation, Methodologies, New Business Segments, Trends In Security.

REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, 10/e, TMH. 2004.
2. Alexis Leon ERP (Demystified), 5/E TMH 2002.
3. David L Olson, Managerial Issues of Enterprise Resource Planning Systems, McGraw Hill International Edition – 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
ARTIFICIAL INTELLIGENCE IN MANUFACTURING (Professional Elective – III)

L	T	P	C
3	0	0	3

Course Objectives: The main objective of this course is to introduce the concepts of Artificial intelligence to students and enable them to apply the concepts in various applications of manufacturing engineering.

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

1. Understand concepts of AI and use various problem-solving methods
2. Understand and describe ANN architecture and apply BPNN.
3. Demonstrate image processing using ANN
4. Understand and apply various supervised and un supervised learning methods.
5. Understand and apply reinforcement learning and ensemble learning techniques

UNIT - I:

Introduction to Artificial Intelligence and Problem Solving

Definition, History, Present state of Artificial Intelligence (AI), Phases of AI, approaches to AI - Hard or Strong AI, Soft or Weak AI, Applied AI, Cognitive AI, and Applications domains focused on manufacturing-role of AI in Industrial Revolution 4.0, components, advantages, challenges.

Problem solving methods- 1. Uninformed search includes Depth First Search (DFS), Breadth First Search (BFS), Uniform Cost Search (UCS), Depth Limited Search, Iterative Deepening Depth First Search (IDDFS) and bidirectional search. 2. Informed Search (heuristic search) includes greedy best first search, A* search, memory bounded heuristic search, learning to search better, Simple problems

UNIT - II:

Neural Networks

Introduction to Perceptron and Neural Networks, Activation and Loss functions, Single Neuron of Human and Human Brain Modelling, ANN architecture-Input layer, Hidden layer and output layer, Types of Neural Networks- Single layer feed-forward network, Multilayer feed-forward network, Multi-Layer Perceptron (MLP), Recurrent networks or feedback ANN, Characteristics of Neural Networks, Simple problems on Back Propagation Algorithms to minimize the error

UNIT - III:

Computer Vision

Introduction to Convolutional Neural Networks (CNNs), What is CNN, Common uses for CNN, CNN's Basic Architecture- LeNet, AlexNet, VGGNet, GoogLeNet, ResNet, Introduction to Images, representation, image extraction, segmentation, analysis, Simple demonstration on Image processing using ANN - Face detection, Finger print recognition etc

UNIT - IV:

Supervised and Unsupervised Learning

Unsupervised learning- Definition, basic concepts, applications, K-means Clustering, hierarchical Clustering, Dimension Reduction-PCA, Simple Examples

Supervised Learning - Definition, basic concepts, applications, Linear Regression, Multiple Variable Linear Regression, Logistic Regression, Naive Bayes Classifiers, k-NN Classification, Support Vector Machine, Simple Examples

UNIT - V:

Reinforcement Learning and Ensemble Learning Techniques

Reinforcement Learning

Reinforcement Learning (RL) Framework, Component of RL Framework, Types of RL Systems. Q-learning, Simple Examples

Ensemble Learning Techniques

Introduction on ensemble methods, Decision Trees, Bagging, Random Forests, Boosting, Simple Examples

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, Stuart Russell & Peter Norvig, Prentice-Hall, Third Edition (2009).

REFERENCES:

1. Artificial Intelligence, Ela Kumar, Wiley, 2021.
2. Artificial Intelligence: Concepts and Applications, Lavika Goel, Kindle Edition, Wiley, 2021.
3. Nature-Inspired Optimization in Advanced Manufacturing Processes and Systems, Edited by Ganesh M. Kakandikar and Dinesh G. Thakur, CRC press, First edition, 2021.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
MARKETING MANAGEMENT (Professional Elective -IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To provide a detailed concept of marketing and demand analysis
2. To enable the student in breaking the market into segments.
3. Impart the knowledge about the product life cycle.
4. Pricing strategy and Sales techniques
5. To enable the student to understand various types of controls in marketing.

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

1. Understand the concept of marketing and forecasting
2. To identify the market segments according to strategy formulation.
3. To understand product management.
4. To utilise various pricing methods and execute sales techniques
5. Understand the concept of marketing and its implementations.

UNIT-I

Introduction to Marketing: Needs, wants, demands, products, exchange, transactions markets, marketing, production concept, sales concept, Product concept, marketing concept, social marketing concept, Indian marketing Environment.

Demand Analysis: Major concepts in Demand measurement, the components of modern market information systems, the marketing intelligence system, the marketing decision system, Forecasting and demand measurement.

UNIT-II

Market segmentation and targeting: identification of market segments, consumer and institutional/ corporate clientele – segmenting consumer markets, segmentation basis. Electing target market segments, segmentation 7 targeting as a basis for strategy formulation Developing and communicating a positioning strategy

UNIT-III

Product management: Product Life Cycle, PLC as a tool marketing strategy, constituents of a product, core product, augmented product, differentiated product, potential product line, product mix, product decisions, brand decisions, classification of new products new product development, idea generation, idea screening, concept testing, business analysis market testing, commercialization.

UNIT-IV

Pricing strategy: Objectives of pricing, methods of Pricing, selecting the final price, adopting the final price, initiating the price cuts, imitating price increases, responding to competitors price changes.

Sales and Distribution management: Sales techniques for Consumer/Industrial clientele- Channel Function and Flows, Channel Levels, Channel Management Decision, types of retailers, trends in retailing, the growth and trends in wholesaling, sales force and sales Agency – Advantages and disadvantages.

UNIT –V

Marketing Communication: The communication process, communication mix, managing advertising sales promotion, public relations and direct marketing, sales force objectives, Sales force structure and size, sales force compensation.

Marketing Organization and Control: Evolution of marketing Department, Organizing the marketing department, marketing Implementations, control of marketing performance, annual plan control, profitability control, efficiency control, strategic control.

REFERENCE BOOKS:

1. Rajan Saxena: marketing Management, 2/c, TMSH, 2002
2. Kerin, Hartly & Ruelilus: Marketing – the core, McGraw Hill, Irwin, 2004
3. Phillip Kotler: Marketing Management, 11/c, Pearson publishers, 2003
4. Lamb,Hair, Mac Daniel: Marketing, 7/e Thomson publishers, 2004.
5. Douglar, Hoffman & Micheal Cziinkota: Marketing, the Best practices 2/e, Thomson publishers, 2004
6. V.S Ramaswamy, S. Namakumari: Marketing Management, 3/e, Macmillan, 2003
7. William D. Perreault, Jr.E. Jerome Mc Carthy, Basic marketing, 14/e TMH, 2002
8. Czinkota and Kotabe: Marketing Management, 2/e, Thomson, 2002

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
ENERGY MANAGEMENT (PROFESSIONAL ELECTIVE – IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To impart knowledge of Energy management.
2. To understand various energy audits.
3. Technology and design for conservation of energy.
4. Methods of evaluation of projects.
5. To enable the student to understand various types of alternative sources of energy.

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

1. Explain principles of energy management.
2. To understand and execute various types of Energy audits.
3. Implement various technologies in energy conservation.
4. To use various methods in evaluating projects.
5. Understand the various alternative energy sources.

UNIT - I:

Introduction: Principles of Energy Management – managerial organization – Functional Areas for
 i. Manufacturing Industry ii. Process Industry iii. Commerce iv. Government.
 Role of Energy Manager in each of this organization.

UNIT - II:

Initiating, Organizing and managing Energy management Programs.
 Energy Audit; Definition and Concepts, Types of Energy Audits – Basic Energy Concepts – Resources for Plant Energy Studies – Data Gathering – Analytical Techniques.

UNIT - III:

Energy Conservation: Technologies for Energy Conservation, Design for Conservation of Energy materials- energy flow networks-critical assessment of energy usage-formulation of objectives and constraints-synthesis of alternative options and technical analysis of options-process integration.
 Economic Analysis: Scope, Characterization of an Investment Project – Types of Depreciation – Time Value of money – budget considerations, Risk Analysis.

UNIT - IV:

Methods of Evaluation of projects; Payback – Annualized Costs – Investor's rate of return- Present worth – Internal Rate of Return – Pros and Cons of the common methods of analysis – replacement analysis.
 Energy Consultant; Need of energy Consultant – Consultant Selection Criteria

UNIT - V:

Alternative Energy Sources: Solar energy – Types of devices for Solar energy Collection – Thermal Storage System – Control Systems-
 Wind energy – Availability – Wind Devices – Wind Characteristics – Performance of Turbines and Systems.

REFERENCE BOOKS:

1. Energy Management Hand book by W.C Turner (Ed)
2. Management by H.Koontz and Cyrill O Donnell
3. Financial Management by S.C Kuchhal
4. Energy Management by W.R Murthy and G.Mc Kay
5. Energy Management Principles by CB Smith

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I Year II Sem. (IEM)
IOT & INDUSTRY 4.0 (PROFESSIONAL ELECTIVE – IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To understand the basics of Industry 4.0
2. To understand the Business model and impact of IIoT
3. To understand the concepts of virtual reality, lean manufacturing
4. To gain knowledge of various sensors and actuators.
5. To understand various data transmission technologies.

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

1. Explain Smart Business Perspective, Cyber security, Impacts of Industry 4.0.
2. Understand the basics of the Industrial Internet of Things.
3. Understand various key technologies.
4. Implement various sensors and actuators.
5. Understand different industrial transmission technologies and IIOT applications in real life

UNIT – I:

Industry 4.0 Basics: Industrial revolution: Phases, Evolution of Industry4.0, Environmental impacts of industrial revolution, Applications, Design requirements, Drivers of Industry4.0, Sustainability Assessment of industries, Smart Business Perspective, Cyber security, Impacts of Industry 4.0.

UNIT – II:

Industrial Internet of Things- Basics: IIoT and Industry 4.0, IIC, Industrial Internet Systems, Design of industrial internet systems, Impact of industrial internet, Benefits of industrial internet, Industrial sensing, Industrial Processes, Features of IIoT for industrial processes, Industrial plant–The future architecture, Digital Enterprise

Business Models and Reference Architecture of IIoT: Definition of a business model, Business models of IIoT, Industrial Internet Reference Architecture

UNIT –III:

Key Technologies: Off-site Technologies, Cloud Computing, Fog Computing

Key Technologies: On-site Technologies, Augmented Reality, Virtual Reality, Smart factories, Lean manufacturing system, Big Data and Advanced Analytics

UNIT –IV:

Sensors: Various sensor types and their underlying working principles, Characteristics of Sensors – Resolution, calibration, accuracy and others, Sensor Categories – Thermal, Mechanical, Electrical, Optical and Acoustic sensors.

Actuators: Thermal, Hydraulic, Pneumatic, Electro mechanical Actuator

UNIT – V:

Industrial Data Transmission and Acquisition: Architecture of various data transmission technologies like Foundation Fieldbus, Profibus, Highway Addressable Remote Transducer (HART), Interbus, Bitbus, DigitalSTROM, Controller Area Network, and other recent and upcoming Technologies. Distributed Control System, SCADA and PLC System.

IOT Applications: IoT Applications on Industrial automation, Factories and Assembly line, Plant Security and Safety, Transportation, Agriculture, Healthcare, Home Automation, Oil, Chemical and Pharmaceutical Industry and others.

TEXT BOOK:

1. Introduction to Industrial Internet of Things and Industry 4.0 by Sudip Misra, Chandana Roy, Anandarup Mukherjee, CRC Press
2. Vijay Madiseti, Arshdeep Bahga, Internet of Things, "A Hands on Approach", University Press.
3. Dr. SRN Reddy, RachitThukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
5. Adrian McEwen, "Designing the Internet of Things", Wiley.
6. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill.
7. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

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

SIMULATION OF MANUFACTURING SYSTEMS LAB

L	T	P	C
0	0	4	2

List of Experiments:

1. Through C++, Creation of class for product with the following elements a) product ID b) processing order c) processing times
2. Through C++, Creation of 5 products as objects from using class called product
3. Creation of classes matching with the following attributes:
 - a) M/c ID b) with accession of varying elements of M/c class
4. Simulation of flow shop manually for calculating total make-span time 2 and 3 machined with n Job
5. Write algorithm for simulation of flow shop system
6. Simulation of job shop system manually for n jobs and 3 machines and compare it with manual system
7. Write a programme for simulation of 2 jobs / n machines of job shop system and compare it with the manual calculation
8. Simulation for M/M/1 for 4 customers arrival considering arrival of customers of Poisson process and service process is exponential distribution
9. Simulation of news boy problem and tied average profit
10. Simulation of EO model with demand of random process and estimate average inventory

REFERENCE BOOKS:

1. Simulation Modelling and Analysis, by Law, A.M and Kelton, W.D 2nd ed McGraw Hill, New York, 1991.
2. Discrete Event System Simulation, by Banks, J. Carson, J.S II, Prentice Hall. Englewood Cliffs, NJ, 1984.
3. Simulation of Manufacturing Systems, by Carrie, A Wiley, New York. 1988.

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

SUPPLY CHAIN MANAGEMENT LAB

L	T	P	C
0	0	4	2

List of Experiments:

1. Network design and operations
2. Designing and planning transportation networks
3. Designing and planning distribution networks
4. Value Stream Mapping – Development of Current State Map and Future State Map
5. Decision Making in Supply Chains
6. Lean, agile and leagile supply chains
7. Supply chain restructuring
8. Supply chain performance measures
9. Inventory optimization in supply chain
10. Forecasting models in supply chain
11. Bear game

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
PRODUCT DATA MANAGEMENT (PROFESSIONAL ELECTIVE – V)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To understand the importance of product development and establish product specifications
2. To gain knowledge on product architecture implications.
3. To understand product development fundamentals and implementations of various tools.
4. Analyse design for manufacturing and Product development.
5. To procure knowledge on various principles of prototyping

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

1. Understand process management and establish product specifications.
2. Understand product architecture implications.
3. Analyze different types of design issues and able to integrate various tools.
4. Estimate manufacturing costs.
5. Plan different types of prototypes

UNIT - I:

Introduction: Need for IPPI) 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 — effect on the solutions and processes — 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 processes 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. Design for Manufacturing and producy Development: Definition - Estimation of Manufacturing cost — reducing the component costs and assembly costs — Minimize system complexity.

UNIT - V:

Prototype basics — Principles of prototyping — planning for prototypes, Economic analysis Understanding and representing tasks - baseline project planning — accelerating the project execution.

REFERENCE BOOKS:

1. Product Design and Development / Kari T. Ulrich and Steven D. Eppinger / McGraw Hill International Edns. 1999.
2. Concurrent Engg/ integrated Product development / Kenneth Crow / DRM Associates, 26/3, Via Olivera, Palos Verdes, CA 90274(3 10)377-569, Workshop Book.
3. Effective Product Design and Development / Stephen Rosenthal / Business One Orwin, Iomewood, 1992, ISBN, 1-55623-603 -4.
4. Tool Design — Integrated Methods for Successful Product Engineering / Stuart Pugh / Addison Wesley Publishing, New York, NY, 1991, ISBN 0-202-41639-5.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
FINANCIAL MANAGEMENT (PROFESSIONAL ELECTIVE – V)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are

1. To understand the basic concepts of financial management.
2. To know various techniques of financial analysis and performance evaluation.
3. Able to take financing decisions.
4. Implementation of ABC analysis and EOQ analysis.
5. To understand various limitations of budgetary control

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

1. Understand and explain various methods of financial management.
2. Analyse risk management and evaluation.
3. Implement planning and estimation of working capital.
4. Utilize various tools like ABC and EOQ
5. Acquire knowledge in profit planning and control.

UNIT - I:

Nature and scope of Financial Management – Introduction of Finance as a function – scope -Tradition and modern methods – objectives of Financial Management – Basic concepts of time value of money, cash flow, risk, return – preparations of income statement and balance sheet.

UNIT – II:

Techniques of financial analysis and performance evaluation – statement of changes in financial position – presentation of cash flow statement- financial performance analysis through ratio analysis. Long term investment decision – capital budgeting purpose and evaluation techniques – Analysis of risk and uncertainty – measurement and evaluation of risk.

UNIT – III:

Financing decisions – operating and financial leverages – combined leverage- capital structure decision – Net income and net operating income approaches – Designing capital structure – Profitability and liquidity aspects and control. Working capital management – planning of working capital – determinants of working capital – estimation of current assets and current liabilities.

UNIT – IV:

Sources of working capital – Trade credit and bank credit RBI frame work for regulation of bank credit – information and reporting system – objectives of cash management – determination of cash needs – cash management. Receivables Management – objectives – credit policies and terms – collection policies – inventory management and its objectives – Quantitative techniques like ABC analysis and EOQ analysis.

UNIT – V:

Profit planning and control – Breakeven analysis and its application – budgets and budgetary control as a management tool – installation of budgetary system – Limitations of Budgetary control – Classification of budgets – preparation of master budget.

REFERENCE BOOKS:

1. Financial Analysis - MC Menamin (Oxford)
2. Management Accounting and Financial Control - SN Maheswari (Sultan Chand and sons).
3. Financial Management - I.M. Pandey (Vikas)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
BUSINESS ANALYTICS (Open Elective)

L	T	P	C
3	0	0	3

Prerequisite: None

Course objectives:

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Mange business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Course Outcomes: At the end of the course,

- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT- I:

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

UNIT- II:

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT- III:

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT- IV:

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting. Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT- V:

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, the Value of Information, Utility and Decision Making. Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

TEXT BOOKS:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
WASTE TO ENERGY (Open Elective)

L	T	P	C
3	0	0	3

Prerequisites: An introductory knowledge of solid and hazardous waste along with some basic understanding of solid waste management at industries

Course Objectives: To prepare the students for successful career in the energy industry, energy service companies, energy utility and consultancy agencies and in the academic and R&D institutions.

To produce graduates strong in understanding on energy resources, technologies and systems, energy management fundamentals, and capable in innovative technological intervention towards the present and potential future energy issues.

To produce energy professionals, who are sensitive to, and well aware of, the energy issues and concerns, and who can apply their specialized knowledge for the sustainable development.

Course Outcomes: Understood and acquired fundamental knowledge on the science and engineering of energy technologies and systems. Acquired the expertise and skills required for energy auditing and management, economical calculation of energy cost, development, implementation, maintenance of energy systems. Become capable of analysis and design of energy conversion systems. Acquired skills in the scientific and technological communications and project preparation, planning and implementation of energy project

UNIT-I:

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste – MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT-II:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal- Methods – Yields and application- Manufacture of pyrolytic oils and gases, yields and applications. Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and updraft gasifiers- Fluidized bed gasifiers- Design, construction and operation- Gasifiers burner arrangement for thermal heating Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-III:

Biomass Combustion: Biomass stoves- Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, Inclined grate combustors, Fluidized bed combustors, Design, construction and operation- Operation of all the above biomass combustors.

UNIT-IV:

Biogas: Properties of biogas (Calorific value and composition)- Biogas plant technology and status- Bio energy system – Design and constructional features- Biomass resources and their classification- BIOMASS CONVERSION PROCESS

UNIT-V:

Thermo chemical conversion – Direct combustion – biomass gasification- pyrolysis and liquefaction- biochemical conversion- anaerobic digestion- Types of biogas Plants- Applications Alcohol production from biomass- Bio diesel production- Urban waste to energy conversion Biomass energy programme in India.

TEXT BOOKS:

1. Non-Conversional Energy by Desai, Ashok V., Wiley Eastern Ltd., 1990.

2. Biogas Technology – A Practical Hand Book by Khandelwal, K.C and Mahdi, S.S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd, 1983.

REFERENCE BOOKS:

1. Food, Feed and Fuel from Biomass by Challal, D.S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology by C.Y. WereKo- Brobby and E.B. Hagan, John Wiley & Sons, 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
CONCURRENT ENGINEERING (Open Elective)

L	T	P	C
3	0	0	3

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 Verlag, 1987.
2. Design for Concurrent Engineering by Cleetus, J. Concurrent Engineering Research Centre, Morgantown W V, 1992.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. II Year I Sem. (IEM)
INDUSTRIAL SAFETY (Open Elective)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide information regarding different elements of industrial water pollution and Methods of treatment.
- To expose to the various industrial applications, maintenance, preventive measures taken against wear and tear.

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

- Know how to take safety measures in executing works
- Identify the need for maintenance (or) replacement of equipment
- Understand the need for periodic and preventive maintenance

UNIT- I

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT- II

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT- III

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications,

- i. Screw down grease cup,
- ii. Pressure grease gun,
- iii. Splash lubrication,
- iv. Gravity lubrication,
- v. Wick feed lubrication
- vi. Side feed lubrication,
- vii. Ring lubrication,

Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT- IV

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like,

- i. Any one machine tool,
- ii. Pump
- iii. Air compressor
- iv. Internal combustion engine,
- v. Boiler,
- vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT- V

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of:

- i. Machine tools,
- ii. Pumps,
- iii. Air compressors,
- iv. Diesel generating (DG) sets,

Program and schedule of preventive maintenance of mechanical and electrical equipment, Advantages of preventive maintenance. Repair cycle concept and importance

REFERENCE BOOKS:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. (IEM)
ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

L	T	P	C
2	0	0	0

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. (IEM)
DISASTER MANAGEMENT (Audit Course - I & II)

L	T	P	C
2	0	0	0

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

L	T	P	C
2	0	0	0

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. (IEM)
VALUE EDUCATION (Audit Course - I & II)

L	T	P	C
2	0	0	0

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. (IEM)
CONSTITUTION OF INDIA (Audit Course - I & II)

L	T	P	C
2	0	0	0

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. (IEM)
PEDAGOGY STUDIES (Audit Course - I & II)

L	T	P	C
2	0	0	0

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

L	T	P	C
2	0	0	0

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.

- Ahinsa, satya, astheya, bramhacharya and aparigraha
- Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:

Asan and Pranayam

UNIT-V:

- Various yog poses and their benefits for mind & body
- Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:

1. 'Yogic Asanas for Group Training-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. (IEM)
PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit Course - I & II)

L	T	P	C
2	0	0	0

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.