FACULTY OF ENGINEERING

Syllabus for the

T. E. (Industrial Engineering)

(w. e. f. 2010-2011)

UNIVERSITY OF PUNE

UNIVERSITY OF PUNE
COURSE STRUCTURE FOR
T.E. (Industrial Engineering) (2008 Course)

SEMESTER- I

Subject Code	Subject	Teaching Scheme (Hrs)		Examination Scheme				
		Lecture	Pr/Dw	Th	Tw	Or	Pr	Total
311101	Production & Operations Management	4	-	100		-	-	100
311102	Advanced Statistics & Numerical Methods	4	2	100	50	-	-	150
311103	Work study	4	-	100	-	-	-	100
311104	Computer Programming & Applications	2	2	-	50	-	50	100
311105	Metrology & QC	4	-	100	-	-	-	100
311106	Machine Design	4	2	100	50	-	-	150
311107	Production Practice- IV	-	2	-	-	-	50	50
	Total	**22**	**8**	**500**	**150**	**-**	**100**	**750**

Semester II

Subject Code	Subject	Teaching Scheme (Hrs)		Examination Scheme				
		Lecture	Pr/Dw	Th	Tw	Or	Pr	Total
311108	Operation Research	4	2	100	50	-	-	150
311109	Ergonomics & Product Design	4	2	100	-	50	-	150
311110	Facilities Planning	4	-	100	-	-	-	100
311111	Management Information Systems	4	2	100	50	-	-	150
311112	Materials Management	4	2	100	-	50	-	150
311113	Seminar	-	2	-	-	50	-	50
	Total	**20**	**10**	**500**	**100**	**150**	**-**	**750**

Th: Theory   Pr: Practical   Dw: Drawing   Tw: Term Work   Or: Oral

Note: Practical/Oral based on Term Work

311101 Production And Operations Management

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**

Unit I: Introduction
History of Operations Management, Operations Organization. Concept of manufacturing and operations management engineering productivity, efficiency utilization, difference between products and service, interrelationship of profitability and productivity, productivity in relationship to material.   **(8)**

Unit II: Operations Strategy
Competitiveness with Operations, Competing on cost, quality, flexibility, speed, Productivity, efficiency & effectiveness.   **(8)**

Unit III: Products & Services Design
New product development: strategies and processes, design process, Cross functional product design, designing for manufacture and assembly, designing for customer, concurrent design and concurrent engineering, considerations in service design, Product design tools – QFD, Value analysis, Modular design, Product life cycle, Taguchi methods, Process analysis, process flow charting, types and evaluation.   **(8)**

Unit IV: Processes & Technology
Types of production systems – Mass, Process, Job Shop, Batch, Project, etc. Process selection types, flow structures, process re-engineering, product process matrix and virtual factory, Technology decisions, Classification of process technologies - manual, mechanized & automated, Process technology in service and non manufacturing operations - distribution and transport, warehousing, point of sale system and banking operations.   **(8)**

Unit V: Facilities Layout
Facility location analysis, basic layouts, designing process layouts, designing product layouts, designing hybrid layouts, Locating production and services facilities: importance of location factor affecting location decisions, Introduction to the concept of line balancing, cycle time, determination of workstation and efficiency, sensitivity analysis of the same.   **(8)**

Unit VI: Material Handling Systems:
As a necessary evil, indicators of poor material handling, principle of good material handling system, different material handling equipment, Material handling function, MH principles, MH Equipment – Cranes & Hoists, Conveyors, Industrial Trucks, AGVs, AS-RS systems, etc.
                                    (8)

Text book:
1. Chase R. B., Jacobs C. R. and Aquilano N. J., "Operations Management for Competitive Advantage", Tata McGraw Hill publishing. ISBN 0-07-958195-9

Reference books:
1. Gaither Norman & Frazier Greg, "Production and Operations Management", Thomson Learning Singapore. ISBN 981-240-384
2. Jhamb L.C., "A Text Book of Purchase Management", Everest Publication House. ISBN81-86314-88-1
3. Chary S. N., "Production and Operation Management", Tata McGraw Hill. ISBN 0-07-451889-5.
4. Adam EE & RJ Ebert, "Production and operation management:, Prentice Hall Englewood Cliff, N.J. ISBN8120308387

311102 Advanced Statistics and Numerical Methods

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**
Practical: 2 Hrs/Week   **TW: 50 Marks**

Unit I
Concept of random variable and probability distributions, discrete random variable and its distributions – Binomial, Poisson, Hypergeometric.   **(8)**

Unit II
Continuous random variable and its distributions - Uniform, Normal, Exponential, Concept of Sampling distribution and various types of it, Statistical inferences – point estimate, interval estimate, Sample size determination.   **(8)**

Unit III
Principles of Statistical inferences – Testing hypotheses and Inferences concerning means, variances and proportions.   **(8)**

Unit IV
Numerical Solution of algebric and transcendental equations by half interval search method, Newton Raphson method. Numerical Solution of Linear Simultaneous equations by Gauss elimination method, Gauss-Siedel method.   **(8)**

Unit V
Numerical integration by Trapezoidal rule, Simpson's. l/3rd and 3/8th rules. Double integration. Curve fitting : Least square criterion-1st and 2nd order.   **(8)**

Unit VI
Interpolation : Lagrange's formula, Inverse interpolation. Numerical solution of differential equations: Euler method, Runge-Kutta 2nd and 4th order methods. Errors and approximations Types off errors, absolute error, relative error, algorithmic errors, truncation error**,** round off error. Error propagation.   **(8)**

Text Books
1. S.C. Chapra, R.P. Canale, "Numerical Methods for engineers with programming and software applications", Tata McGraw Hill Co.Ltd,New Delhi,ISBN 0 07 115895 2.
2. Srivastva V. K., Shenoy G.V., "Quantitative Techniques For managerial Decision Making", Wiley Eastern Ltd.

Reference Books
1. Rajaraman V., "Computer Oriented Numerical Methods", 3rd edition, Prentice Hall of India Pvt. Ltd. ISBN 81-203-0786-0
2. Sastry S. S., "Introductory methods of Numerical Analysis", Prentice Hall of India Pvt. Ltd. ISBN 81-203-1266-X
3. Jain M. K., Iyengar S. R .K. and Jain R. K., "Numerical Methods for Scientific and Engineering Computations", Wiley Eastern Publication. ISBN 0-85226-434-8
4. Grewal B. S., "Numerical Methods in Engineering and Science", Khanna Publishers. ISBN 81-7409-146-7
5. Richardson, "Statistics For Engineers", TATA McGraw Hill.

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311103 Work Study

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Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**

Unit I: Introduction to Industrial Engineering:
Historical background, Contribution of Taylor and Gilbreth, Productivity Improvement, Work content analysis, Definition and scope of Work Study.   **(8)**

Unit II: Method Study
Definition, Steps in method Study, need to record the activities, symbols in charting, different recording techniques – Charts and Diagrams, Questioning Technique, Principals of motion Economy.   **(8)**

Unit III: Work Measurement
Definition of Time study, steps in time study, Allowances, application of allowances, Calculation of standard time, work sampling, advantages of work sampling, Rating,   **(8)**

Unit IV: Predetermined Time Standards
Introduction, Different types of PMTS systems, Methods Time measurement, Introduction to Most technique, Basic, Mini and maxi MOST, General move, Control Move, Tool sequence
                                     (8)

Unit V: Job Evaluation and Merit Rating
Introduction to Job Evaluation system, necessity, Job Analysis, Job Description, Job Evaluation, Different Job Evaluation Systems like Factor Comparison, Point System etc, merit rating, Incentive plans   **(8)**

Unit VI: Application of Work Study
Application of Work Study in manufacturing and service sector, use and application of various techniques of work study, Case studies and analysis, cost savings and indirect benefits
                                     (8)

Text Books
  1. ILO, "Introduction to work-study", Universal Publishing Company. ISBN 81-8502700-4.

Reference Books:
1. Yoga M., Job Evaluation, NPC, New Delhi
2. Zandin K.B. - Most Work Measurement Systems
3. Maynard H. B., "Industrial Engineering Handbook", 3rd edition, McGraw Hill Book Company. ISBN 0-07-041084-4

311104 Computer Programming and Applications

Teaching Scheme: **Examination Scheme:**
Lectures: 2 Hrs/Week   **TW: 50 Marks**
Practical: 2 Hrs/Week   **PR: 50 Marks**

Any 6 of the following 10 experiments have to be performed:
1. Prepare forms for accepting database of students in Visual Basic
2. Write programs for simple calculator, alarms digital/analog clock
3. Use of various controls in VB through programming: list box, scroll, check box, option, use of array, text boxes, viewing files on the computer, etc.
4. Creation of database for accepting bio-data of students
5. Write program to integrate 1 & 4 above
6. Prepare an application for the department library
7. Prepare an application that takes care of continuous assessment of students
8. Prepare a program that can save day wise events / day planner
9. Write a programme for the Class test marks analysis system.
10. Write a programme for the Calendar

Text Books:
1. Petroutsos Evangelos, "Mastering Visual Basic 6", BPB Publication. ISBN 81-7656-031-6
2. Balena Francis, "Microsoft Programming Visual Basic 6", WP Publishers & Distributors.

Reference Books:
1. Mcsd Visual Basic 6.0 Distributed Application Study
2. Penfold J W Microsoft Visual Basic: The Programmer's Companion

311105: Metrology and Quality Control

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**

Unit I: Introduction
Meaning of Metrology, Precision, Accuracy, Errors in Measurement, Calibration. Linear Measurement: Standards, Line Standard, End Standard, Wavelength Standard, Classification of Standards , Precision and Non Precision Measuring instruments, Slip Gauges. Angular Measurement: Sine bar, Sine Center, Uses of sine bars, angle gauges, Auto Collimator Angle Dekkor, Constant deviation prism.   **(8)**

Unit II: Limits, Fits and Tolerances
Meaning of Limit, Fits and Tolerance, Cost – Tolerance relationship, concept of Interchangeability, Indian Standard System.
Design of limits Gauges: Types, Uses, Taylor's Principle, Design of Limit Gauges.
Inspection of Geometric parameters: Straightness, Parallelism, Concentricity, Scariness, and Circularity. Comparators: Uses, Types, Advantages and Disadvantages of various types of Comparators.   **(8)**

Unit III: Surface Finish Measurement
Surface Texture, Meaning of RMS and CLA values, Tomlison's Surface Meter, Taylor-Hobson Surface Meter, Grades of Roughness, Specifications.Screw Thread Metrology: External Screw Thread terminology, Floating Carriage Instruments, Pitch and flank Measurement of External Screw Thread. Gear Metrology: Spur Gear Parameters and their Inspection Methods. Interferometry: Introduction, Flatness testing by interferometry, NPL Flatness Interferometer. Study of Measuring Machines, Recent Trends in Engineering Metrology.   **(8)**

Unit IV
Introduction to Quality Control
Meaning of Quality, Quality of Product, Quality of Service, Cost of Quality, Value of Quality, Difference between Inspection, Quality Control and Quality Assurance, Role of Quality in Present day environment. Introduction to Quality Control: 1) Meaning of quality Control 2) 100% Inspection and Selective Inspection 3) Statistics in Selective inspection. Introduction to Statistical Quality Control: Control Charts, X, R, P and C Charts, Sampling inspection, OC Curves and Sampling Plan, Process Capability Index (PCI), Concept, Methods of determining PCI and uses of PCI.   **(8)**

Unit V
Quality assurance systems
Total quality management (T.Q.M):- Approaches- Deming's Approach, Juran's Approach, Cause and Effect Diagram, Pareto Analysis, Q.F.D., Quality Circles, Taguchi's quality engineering, Kaizen, six sigma, T.P.M. Technical Specification (T.S) TS 16949 Standards.
Reliability Engineering :- Concept.
Design of experiment : meaning , objective, types of research, approaches.   **(8)**

Unit VI
ISO Standards
ISO 9001-2000 Series of Standards- History and Evolution of ISO 9000 Series , importance and overview of ISO 9000- 1998 Series standards, structure of ISO 9000-2000 Series standards, clauses of ISO 9000 series standards and their interpretation and implementation, quality system documentation and audit.
ISO 14000:- environmental management concepts, and requirement of ISO 14001 , benefits of environmental management Systems
 Malcom Baldrige national quality Award and other quality awards   **(8)**

Text Books:
1. R.K. Jain, "Engineering Metrology", Khanna Publication.
2. K.J.Hume, "Engineering Metrology", Kalyani publication ISBN8170290015

Reference Books:
1. K.W.B.Sharp, "Practical Engineering Metrology", Pitman Publication
2. F. M. Gryna, R. Chua & J. Defco, "Jurans Quality Planning and Analysis for Enterprise Quality", McGraw Hill series. ISBN0070618488
3. Juran's Quality Control Handbook. ISBN0071005102
4. I.C.Gupta, "A Text book of Engineering Metrology", Dhanpat Rai and Sons
5. E.L.Grant & R.S. Leavenworth, "Statistical Quality Control", Tata McGraw Hill.
6. Kaoru Ishikawa, "Guide to Quality Control", Asian Productivity Organisation, Series, Tokyo.
7. Singh A. W., "ISO 9000 Quality System", Dolphin Books Delhi.
8. International Trade Center, "ISO 9000 Quality Management System", Geneva

311106 Machine Design

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**
Practical: - 2 Hrs/Week   **TW: - 50 Marks**

Unit I: Spur Gears
Introduction, Standard Proportions of Gear Systems, Gear Materials, various design considerations, Beam Strength of gear teeth- Lewis Equation, tangential loading, module Calculations, width calculations, Dynamic tooth loads, Spott's Equation, types of gear tooth failures, Spur Gear construction, Design of shaft for Spur Gears, Design of arms for Spur Gears.   **(8)**

Unit- II: Helical Gears:
Introduction, Terms used in Helical Gears, Face width of Helical Gear Formative no. of teeth and minimum no. of teeth to avoid interference and undercutting, Proportion of the Helical Gears, Strength of Helical Gears, Design of Helical Gears.   **(8)**

Unit III: Rolling Contact Bearings
Types, Static and Dynamic load Capacity, Stribeck's Equation, Concept of equivalent load, Load life Relationship, Selection of bearing from Manufacturer's Catalogue, Design for variable loads and Speeds, Bearings with Probability of Survival other than 90%, Lubrication and Mounting of bearings, oil Seals and packing used for bearings.   **(8)**

Unit IV: Design for cyclic loads
Stress Concentration and remedies, S. N. Diagram, Endurance limit, Factors affecting Endurance Strength, Design for Finite and Infinite life under reverse stresses, Cumulative damage, Sodberg's and Goodman's Diagram, Design of components like shaft, bolted joints, springs etc. subjected to variable loading.   **(8)**

Unit V: Design for Manufacture
General Principles for Design for Manufacture, Principles of design for casting, Forging, Machining, Welded Joints, etc., Design for Manufacturing Assembly
Statistical Considerations in Design: Analysis of Tolerances, Assembly of parts, Design and Natural Tolerances, Normal Distribution, Applications in Design Process**.**   **(8)**

Unit VI: Flywheel
Introduction, Coefficient of fluctuation of speed, Fluctuation of energy, Maximum fluctuation of energy, Energy stored in flywheel, Stresses in flywheel rim, Stresses in flywheel Arms, Design of shaft, hub and key, construction of flywheel. Optimization Techniques:- The concept of optimization, Classification of optimization problem, engineering, applications of optimization, Role of computers in optimization, Mathematical formulation of optimization problems. Johnson's method for mechanical engineering design. Typical design equation, Classification, example.   **(8)**

Text Books

1. Bhandari V.B., "Design of Machine Elements", Tata Mcgraw-hill publishing, 1984, ISBN 0-07-0611416

2. Shigley J. E. and Mischke C. R., "Mechanical Engineering Design", McGraw- Hill publication Co. Ltd., 1989, ISBN 0-07-049462-2.

Reference Books

1. Spotts M. F. and Shoup T. E., "Design of Machine Elements", 8ed., Pearson Education pvt. Ltd., 2008, ISBN 81 -7758- 4219.
2. PSG, "Design Data", M/S DPV Printers, 1984.
3. Willium C.Ortwein, "Machine Component Design", West Pub. Co. and Jaico Publication House.
1. R.K.Jain, "Machine Design", Khanna Publication Delhi.
2. R.S.Khurmi, J.K.Gupta, "Theory of Machine", S Chand Co. Delhi. ISBN812192524X

311107 Production Practice-IV

Teaching Scheme: **Examination Scheme:**
Practical: 2 Hrs/W eek   **Practical: 50 Marks**

Each candidate shall be required to complete and submit the following term work.
Composite job involving different machining operations.

Part A:-

1. **Lathe:** external and internal threading (Vee, Square or Acme threads), taper turning, grooving, knurling, drilling operations on lathe.
2. **Milling**: helical or bevel gear cutting on a milling machine.

Part B:- Journal consisting of :

1. Preparation of journal consisting of calculation and procedure for above gear cutting on milling machine.
2. Safety aspects used in the machine shop:- Precautions and care to be taken while working on various machine tools e.g. lathe, milling, drilling, grinding etc.

Note: - A practical examination of 12 hours duration shall be conducted at the end of semester based on the part A

311108 Operations Research

Teaching Scheme:
Lectures: 4 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Paper: 100 Marks
TW: 50 Marks

Unit I: Introduction & Formulation Of LPP Model

OR methodology, Definition of OR, Application of OR to engineering and Managerial problems, Features of OR models, Limitation of OR, formulation LPP Models. **(8)**

Unit II: Linear Programming

Definition, mathematical formulation, standard form, solution space, solution – feasible, basic feasible, optimal, infeasible, multiple, optimal, Redundancy, Degeneracy. Graphical and simplex methods. Variants of simplex algorithm – Artificial basis techniques, Big M Method **(8)**

Unit III: Transportation Problem

Formulation of transportation model, Basic feasible solution using different methods (North-West corner, Least Cost, Vogel's Approximation Method) Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Variants in Transportation Problems, Applications of Transportation problems. Transshipment problems. **(8)**

Unit IV: Assignment Problem & Scheduling

Formulation of the Assignment problem, unbalanced assignment problem, various methods of job shop scheduling. **(8)**

Unit V: Replacement Analysis

Replacement of capital equipments that deteriorates with time,
time value of money (a) remains same (b) changes with constant rates during period.
Equipment renewal policy, group and individual replacement.
Individual Replacement, Group Replacement Policies, Problems. **(8)**

Unit VI: Games Theory

Introduction, two -person zero sum game, minimax and maximin principle, saddle point, methods for solving game problems with mixed strategies, Graphical and iterative methods, solving game by LP Method. **(8)**

Text books:
1. H. A Taha., "Operations Research", An introduction Prentice Hall Pvt. Ltd., ISBN 81-203-1222-8.
2. R. Panneerselvam, "Operations Research", Prentice Hall of India Ltd., ISBN 81-203-1923-0.
3. Philips, Ravindram and Soleberg, "Principles of Operations Research – Theory and Practice", Prentice Hall of India.

Reference books:
1. F. S. Hillier, G. J Lieberman, "Introduction to Operations Research", Tata McGraw-Hill, ISBN 0-07-047387-0.
2. S. D. Sharma, "Operations Research", Kedarnath Ramnath and company Publications.
3. J K Sharma, Operations Research Theory and Application, Pearson Education Pvt Ltd ,2nd Edn, ISBN-0333-92394-4
4. Kanthi Swarup & others – Operations Research, Sultan chand and Sons.

311109: Ergonomics and Product Design

Teaching Scheme:	Examination Scheme:
Lectures: **4 Hrs/Week**	Paper: 100 Marks
Practical: **2 Hrs/Week**	OR: 50 Marks

Unit I
Product methodology & the structure of Design Process , Introduction of Product methodology , methodological problems, characteristics of methods, The phases of product design process, foundations of phase models, three phase models etc. **(8)**

Unit II
Design materials & human factors in product design, material properties, metals, plastics, rubber, woods & factors considered while designing for metals, plastics, rubber, woods etc, Anthropometry factors, physiological factors, psychology factors, anatomy factors. **(8)**

Unit III
Economic factors influencing design, product value, safety, reliability & environmental considerations, economic analysis, break even analysis, profit & competitiveness, economic of a new product design. **(8)**

Unit IV
Value engineering in product design, introduction, historical perspective, nature & measurement of value, importance of value, value analysis job plan, creativity, steps for solving & value analysis, value analysis tests. **(8)**

Unit V
Ergonomics: Definition, Scope, Historical background, Human- machine system interfaces, Basic Ergonomics, Work Physiology, Measurement of work, Introduction to Environmental Ergonomics. **(8)**

Unit VI
Applied Anthropometry: Definition and scope, use of anthropometric data, statistical analysis, Product design and work station design using anthropometric data, Work Space design. **(8)**

Text Books:
1. A.K.Chitale, R.C Gupta, "Product design & Manufacturing", Prentice Hall of India Pvt. Ltd. ISBN 81-203-1216-3.
2. Product Design : Fundamentals & Methods – N.F.M. Roozenburg & J.Eekels
3. ILO, "Introduction to work-study", Universal Publishing Company, ISBN 81-8502700-4.
4. M. S. Sanders and Ernest J. McCormick, "Human factors Engineering and Design"

Reference Books:
1. Product design & Manufacture- Jhon R Lindbeck
2. Mayall W.H., "Industrial Design for Engineers" London Liifee Books Ltd. 1967
3. Dale Huchingson R "New Horizons for Human Factors in Design " McGraw Hill Company 19811.Indistrial Design-Mayall
4. ILO, "Job Evaluation", Oxford & IBH Publishing Co. Pvt. Ltd.
5. Yoga M., "Job Evaluation", NPC, New Delhi
6. Zandin K.B. "Most Work Measurement Systems"
7. Maynard H. B., "Industrial Engineering Handbook".

311110 Facilities Planning

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**

Unit I
Scope of Plant Engineering, Plant Layout – Introduction, Types of Plant Layout, Phases of Layout Planning, Plant Location, Urban v/s Rural Location.   **(8)**

Unit II
Systematic Layout Planning, P-Q Analysis, Flow of Materials Analysis, Activity Relationship Analysis, Space Requirements & Availability, Modifying Considerations, Practical Limitations, Selection of Layout, Installation of Layout.   **(8)**

Unit III
Material Handling Function, Principles of Material Handling, MH Equipment – Conveyors, MH Equipment – Cranes, MH Equipment – Trucks.   **(8)**

Unit IV
Systematic Handling Analysis, External Integration, Classification of Materials, Layout Considerations, Analysis of Moves, Visualization of Moves, Flow Diagram – DI Plot, Preliminary Handling Plans, Modifications & Practical Limitations, Calculation of Requirements, Evaluation of Alternatives, Installation.   **(8)**

Unit V
Maintenance Function, Types of Maintenance, TPM – Introduction, TPM Pillars, 5S Technique, Overall Equipment Effectiveness.   **(8)**

Unit VI
Computerized Layout Planning, CORELAP, CRAFT, ALDEP.   **(8)**

Text Books
1. Francis R. L, White J. A. and Mcginnis L. F., "Facilities Layout and Location-An analytical approach", Prentice Hall of India Pvt. Ltd. ISBN 81-203-1460-3.
2. Tomkins J.A. and White J.A. , "Facilities Planning", John Wiley & sons.

Reference Books
1. Porter M. E, "Competitive Advantage", The Free Press.
2. Carr D. K. and Johansson H. J, "Best practices in Reengineering", McGraw Hill, Inc.
3. Humphreys K. K., "Jelen's Cost and Optimization Engineering", McGraw Hill,International.

4. Cheekland P., "Systems thinking, Systems Practice", John Wiley & sons.
5. B.W. Niebel , "Motion and Time Study", Richard Irwin.
6. Miles L. D., "Techniques of Value analysis and Engineering", McGraw Hill.
7. Hitomi K., "Manufacturing Systems Engineering"; Viva Books Pvt Ltd, India.
8. Law A.W. and.Kelton W.D, "Simulation Modeling and Analysis", McGraw Hill International Edition
9. Bell G.F.and Balkwill J , "Management in Engineering", Prentice Hall India.
10. Apple J.M., "Plant Layout and Material Handling", McGraw Hill.

311111 Management Information System

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**
Practical: 2 Hrs/Week   **TW: 50 Marks**

Unit I: Introduction
Definitions, objective, structure, operating elements, MIS structure based on management activity, organizational function. **(8)**

Unit II: System concepts
Definition, Types of systems, system decomposition, system entropy, system stress, methods of simplification, design concepts. **(8)**

Unit III: SDLC approach
System development life cycle approach, system requirement specifications, entity relationship diagram, data dictionary, report generation, database administration. **(8)**

Unit IV: Object Oriented Analysis and Design
Introduction, concepts of objects, class, encapsulation, various steps of OOA, methods like Booch, Rambaugh etc. Domain Analysis, Human computer Interface, Introduction to System Testing. **(8)**

Unit V: Decision Support System
Introduction to decision support system, experts systems, hardware and software acquisition, legal Issues. **(8)**

Unit VI: Information Management and society
Computer security, privacy, manual versus electronic information, back up protection, user interfaces, encryption, responsibility and ethics. **(8)**

Text Book
1. Joshi S. D., "Software Engineering".

Reference Books:
1. Jawadekar W.S., "Management Information System".
2. Davis G.B , "Management Information System".
3. Obrien J.C., "Management Information System".
4. Mc Cory Keith R. "Management Information System".
5. Pressman R.S., "Software Engineering".
6. Prasad R. S., "Software Engineering".

<center>**311112: Materials Management**</center>

Teaching Scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week   **Paper: 100 Marks**
Practical: 2 Hrs/Week   **OR: 50 Marks**

Unit I: Introduction to Materials Management
What are Inventories, need of inventories, objectives of an Inventory Control system, concept of Rate of Return with respect to Inventories, Symptoms of poor Inventory management, Purchase procedure.   **(8)**

Unit II: Classification and Costs of Inventories
Different types of Inventories, Inventory carrying cost, procurement cost, set up cost, stock out cost, Inventory cost curve, problems based on inventory costs, EOQ concept, assumptions of EOQ model, mathematical treatment of economic buying, Extension of basic EOQ model.
                                                                                      (8)
Unit III: Selective Inventory Control
Concept of Selective Inventory Control, ABC analysis, VED analysis, HML analysis, SDE analysis, SOS analysis, FSN analysis, GOLF analysis, Concept of Lead time and its effects on Inventory, Internal and External lead time, Elements of lead time, Evaluation and ways to minimize lead time, Vendor development and vendor rating.   **(8)**

Unit IV: Replenishment Systems
Introduction, Different types of replenishment systems like Fixed order quantity system, Fixed order interval system, Combination of fixed order interval and quantity system, Tow Bin System, Safety stocks.   **(8)**

Unit V: Surplus and Obsolescent stocks
Introduction, Genesis of surplus materials, Disposal of surplus and obsolete materials, need of physical stock taking, method of stock taking like annual, continuous, reorder point stock taking, Inventory records.   **(8)**

Unit VI: Manufacturing Resource Planning
Why Inventory control is an integrated approach? Concept of Manufacturing Resource Planning (MRP), MRP I and MRP II, case studied in MRP, Introduction to ERP.   **(8)**

Text Books
 1. L.C. Jhamb, "Inventory management", Everest Publishing House.

Reference Books:

1. Dobler Burt, "Material Management".
2. Silver and Peterson, "Inventory management", John Willey and sons

<h1 style="text-align:center">311113 Seminar</h1>

Teaching Scheme: **Examination Scheme:**
Practical: 02 Hrs/Week   **Oral: 50 Marks**

a). The objective of Seminar is to test the student on his/her ability for self-study and his/her ability to communicate - Written and oral.

b). Seminar will be in the form of a report submitted by the student:

It will be -

1. Done by a student individually, on topic of his/her choice based on literature survey/ a case study wherever applicable/possible, and approved by the staff-in- charge,
2. A report with 15-20 pages of A-4 size paper, 1.5 spaced typed material, and appropriately bound.
3. Title font/figures/graphs shall be black and white.

c) The Oral examination will be based on the report submitted and (orally) presented.