



## **SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR - 440013**

An Autonomous College affiliated to  
Rashtrasant Tukadoji Maharaj Nagpur University,  
Nagpur, Maharashtra (INDIA)

### **PROGRAMME SCHEME & SYLLABI 2017-19**

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### **M.TECH. (INDUSTRIAL ENGINEERING)**

**About The Department :**

Shri Ramdeobaba College of Engineering & Management has the distinction of offering first inter disciplinarily post graduate programme in Industrial Engineering in the year 2004.

This Post Graduate programme has the available expertise of its core faculty supported by faculty of other departments and expert faculty from other engineering colleges. Faculty specialises in Operations Research, Quality Management, Human factors Engineering, Simulation and Modelling. Most of the faculty members are doctorates and deeply involved in the research work. The programme is functioning with the state of the art laboratories and close association with industries around.

All the Post Graduate Projects are based on live problems offered by the industry.

**Vision of the Department:**

To be a leader in imparting knowledge of creating efficient and effective systems for manufacturing and service organizations.

**Mission of the Department:**

- To nourish a learning environment conducive to foster innovations in Industrial Engineering.
- Improvement in Industrial productivity by devising systems and quality standards.
- Sintering the engineering knowledge by research support.

Absorption of such knowledge in teaching and learning process and its reapplication to quasi-similar situations.

**Programme Educational Objectives :**

- PEO1.** Programme will prepare students to work in any engineering organization and undertake research work with integrity.
- PEO2.** Programme will ensure development of problem solving ability through the use of industrial engineering tools and software.
- PEO3.** Programme will encourage development of independent thinking & also the ability to work in teams through live projects undertaken in industry professionally.

**Programme Outcomes :**

1. Students will be able to acquire the knowledge of Industrial Engineering with an ability to analyze and synthesize existing and new knowledge for its enhancement.
2. Students will be able to make creative advances for conducting research. They will be able to critically analyze engineering problems and apply their independent judgement for synthesizing information.

Published by

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Principal

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ISO 9001 : 2008 CERTIFIED ORGANISATION

3. Students will be able to provide a feasible optimal solution for engineering problems considering public health, safety, culture, society and environment.
4. Students will be able to contribute individually and in group to the development of scientific knowledge by using appropriate research methodology.
5. Students will be able to learn and apply appropriate techniques, resources, and modern engineering and IT tools, including simulation and modeling, to complex engineering activities.
6. Students will possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research.
7. Students will acquire the knowledge of managing projects efficiently in multi disciplinary environments with due consideration to economical factors, as a leader and as a member.
8. Students will be able to comprehend and write effective reports and design documentation, will have the ability to effectively communicate with the engineering community regarding complex engineering activities.
9. Students are capable to recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of commitment.
10. Students will acquire enough maturity to behave in the most responsible manner towards society, acquire decision making ability with due consideration to ethics, professional code of conduct and integrity.
11. Independently improve on the decisions taken and take corrective actions.

### Scheme of Examination of Master of Technology (Industrial Engineering) Semester Pattern

#### I Semester M. Tech. (Industrial Engineering)

Sr. No.	Subject Code	Subject Name	L	P	Credits	Maximum Marks			Exam Duration (Hrs)	Category
						Internal Assessment	End Semester Exam	Total		
1	INT551	Operations Research	4	0	4	40	60	100	3	PC
2	INT552	Statistics & Quality Control	4	0	4	40	60	100	3	PC
3	INT553	Planning and Control of Manufacturing Systems	4	0	4	40	60	100	3	PC
4	INP554	Lab Practice-I	0	4	2	25	25	50	-	PC
5	INT555	<b>Program Elective-I</b>	4	0	4	40	60	100	3	PE
6	MET556	<b>Research Methodology</b>	3	0	3	40	60	100	3	FC
<b>Total</b>			<b>19</b>	<b>4</b>	<b>21</b>	<b>225</b>	<b>325</b>	<b>550</b>	<b>-</b>	<b>-</b>

Sr no	Course Code	Program Elective-1
1	INT 555-1	Automation In Production
2	INT 555-2	Financial Management
3	INT 555-3	Marketing Management
4	INT 555-4	Human Capital Management

**Scheme of Examination of Master of Technology (Industrial Engineering)  
Semester Pattern**

**II Semester M. Tech. (Industrial Engineering)**

Sr. No.	Subject Code	Subject Name	L	P	Credits	Maximum Marks				Category
						Internal Assessment	End Semester Exam	Total	Exam Duration (Hrs)	
1	INT 556	Supply Chain Management	4	0	4	40	60	100	3	PC
2	INT 557	Human Factors Engineering	4	0	4	40	60	100	3	PC
3	INT 558	Maintenance Engg.	4	0	4	40	60	100	3	PC
4	INP559	Lab Practice-II	0	4	2	25	25	50	-	PC
5	INT 560	<b>Program Elective-II</b>	4	0	4	40	60	100	3	PE
6	INT 561	<b>Advanced Computation Techniques</b>	3	0	3	40	60	100	3	FC
7	INT 599	<b>Open Elective</b>	3	0	3	40	60	100	3	OE
		<b>Total</b>	<b>22</b>	<b>4</b>	<b>24</b>	<b>265</b>	<b>385</b>	<b>650</b>	<b>-</b>	<b>-</b>

Sr no	Course Code	Program Elective-II
1	INT 560-1	Materials Management
2	INT 560-2	Reliability Engineering
3	INT 560-3	Project Management

Sr no	Course Code	Open Electives
1	INT 599-1	Quality Management
2	INT 599-2	Optimization Techniques
3	INT 599-3	Fundamentals of financial Management

**Scheme of Examination of Master of Technology (Industrial Engineering)  
Semester Pattern**

**III Semester M. Tech. (Industrial Engineering)**

Sr. No.	Subject Code	Subject Name	L	P	Credits	Maximum Marks				Category
						Internal Assessment	End Semester Exam	Total	Exam Duration (Hrs)	
1	INT 651/ MET 651	<b>Group Elective-I</b>	4	0	4	40	60	100	3	GE
2	INT 652/ MET 652	<b>Group Elective-II</b>	4	0	4	40	60	100	3	GE
3	INP 653	<b>Project Phase-I</b>		3	6	100	100	200	-	-
		<b>Total</b>	<b>8</b>	<b>3</b>	<b>14</b>	<b>180</b>	<b>220</b>	<b>400</b>	<b>-</b>	<b>-</b>

**GIM is group head of Industrial and Mechanical Engineering PG Program**

Sr no	Course Code	Group Elective-I
1	INT 651-1	Total Quality Management
2	INT 651-2	Value Engineering
3	INT 651-3	System Design Engineering
4	MET651-1	Energy Conservation & Management
5	MET651-2	Thermal Storage System
6	MET651-3	Advanced Turbo Machinery

Sr no	Course Code	Group Elective-II
	INT 652-1	Computer & Database Management Systems
	INT 652-2	Manufacturing Economic Analysis
	INT 652-3	Business Communications
	MET652-1	Environmental Pollution and Control
	MET652-2	Design of Heat Exchangers
	MET652-3	Cryogenics
	MET652-4	Advanced IC Engines and Alternative Fuels

**Scheme of Examination of Master of Technology (Industrial Engineering)  
Semester Pattern**

**IV Semester M. Tech (Industrial Engineering)**

Sr. No.	Subject Code	Subject Name	L	P	Credits	Maximum Marks				Category
						Internal Assessment	End Semester Exam	Total	Exam Duration (Hrs)	
1	<b>INP654</b>	Project Phase - II		6	12	200	200	400	-	-
		<b>Total</b>		6	12	200	200	400	-	-

**Summary of the Credits**

Sr no	Semester	Credits
1	<b>I</b>	21
2	<b>II</b>	24
3	<b>III</b>	14
4	<b>IV</b>	12
	<b>Total</b>	<b>71</b>

**Summary of the Marks**

Sr. no	Semester	Internal Assessment	End Semester Exam	Total Marks
1	<b>I</b>	225	325	550
2	<b>II</b>	265	385	650
3	<b>III</b>	180	220	400
4	<b>IV</b>	200	200	400
	<b>Total</b>	<b>870</b>	<b>1130</b>	<b>2000</b>

**Syllabus**

Course Code: INT551

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Course : Operations Research

Total Credits : 4

**Course Outcomes :**

1. Formulate Situation concerned as on LPP and solve it by simplex method. They will also be able to carry out sensitivity analysis on various constituents of LPP.
2. Apply LPP concepts to some applications like transportation problem, assignment problem, and game. They will also get the concept of optimal sequencing of operations.
3. Determine specifications for effective design of queuing system.
4. Simulate, queuing, inventory management systems.
5. Determine optimal solution using dynamic programming approach.
6. Analyze flow networks, activity networks through the perspectives.

**Syllabus :**

Introduction

Introduction to O.R, Optimization Techniques, Model Formulation, Assignment, Transportation models, General Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models, Deterministic and Probabilistic Models. Waiting Line Models, Single channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Shortest Route Problems, Game Theory Simulation, Project Networks.

**Reference Books :**

1. Operations Research: Hitler Liebermann, McGraw Hill Pub.
2. Operations Research: Pannerselvam, Prentice Hall of India
3. Principles of Operations Research: Harvey M Wagner, Prentice Hall of India

**Course Code: INT552****Course : Statistics & Quality Control****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. Understand the applications of Probability distribution in predicting behavior of the process.
2. Develop conceptual understanding of Quality of Product and Process and its Management.
3. Develop Control charts for process control.
4. Develop understanding of sampling plans for acceptance of materials.
5. Understanding of concepts such as Six sigma, Lean Production and JIT

**Syllabus :**

Statistical Methods Useful in Quality Improvement Introduction to Quality, Meaning of Quality, Brief History of Quality Control and Improvement, Statistical Methods of Quality Control and Improvement, Other Aspects of Quality Control and Improvement.

Modeling Process Quality, Describing Variation, Important Discrete Distributions, Important Continuous Distributions, Inferences about Process Quality

Statistics and Sampling Distributions, Point Estimation of Process Parameters, Statistical Inference for Two Samples, Statistical Inference for more than Two Populations, Basic Methods of Statistical Process Control and Capability Analysis

Methods and Philosophy of Statistical Process Control Introduction, Chance and Assignable Causes of Quality, Statistical Basis of the Control Chart, QC tools, New seven QC tools, Pareto analysis, Implementing SPC, An Application of SPC, Control Charts for Variables, Control Charts for  $\bar{x}$  and R, Applications of Variables Control Charts.

Control Charts for Attributes, Control Charts for Fraction Nonconforming, Control Charts for Nonconformities (Defects), Choice between Attributes and Variables Control Charts, Guidelines for Implementing Control Charts.

Process and Measurement System Capability Analysis, Process Capability Analysis Using a Histogram or a Probability Plot, Process Capability Ratios, Process Capability Analysis Using a Control Chart, Process Capability Analysis Using Designed Experiments, Gage and Measurement System Capability Studies, Setting Specification Limits on Discrete Components.

Acceptance Sampling, Lot-by-Lot Acceptance Sampling for Attributes, Acceptance Sampling Problem, Single-Sampling Plans for Attributes, Double, Multiple, and Sequential Sampling, Military Standard 105E (ANSI/ASQCZ1.4, ISO 2859), Conceptual understanding of AQL, LTPD. Applications of OC curve.

Six Sigma/Lean, Six Sigma, DMAIC, Application of Six Sigma tools to minimize production variability, Taguchi Loss Function, Lean Production and Quality, The Birth of Lean Production, The Lean Production System, Stability, Just-In-Time

**Reference Books:**

1. Statistical Quality Control: E. L. Grant, Richard S. Leavenworth, Tata McGraw Hill.
2. Quality Planning and Analysis: Juran, Tata McGraw Hill.
3. The Assurance Sciences: S. Halpern, Prentice Hall India Ltd. New Delhi,
4. Managerial Statistics: Winston and Zappen Duxbury, Thompson Learning Inc.

**Course Code : INT553****Course : Planning and Control of Manufacturing Systems****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. Students shall be able to understand different manufacturing systems and facility planning.
2. Students shall be able to understand aggregate planning.
3. Students shall be able to understand sequencing and scheduling in manufacturing systems.
4. Students shall be able to understand planning and control of group technology & cellular manufacturing.

**Syllabus**

Types of manufacturing systems and their associated planning and control problems, material handling and Material flow characteristics in manufacturing systems. Tools and techniques of facility planning and layout techniques. Production planning and control, Demand Forecasting, Capacity planning: tools and techniques, Aggregate production planning, MRP, ERP.

Sequencing Decisions in Single Machine and Flow Shops, Job-Shop Scheduling, Scheduling in parallel Machines and Networks, simulation and priority rules. Problems of planning and control of group technology, cellular manufacturing, CIMS and FMS.

**Reference Books :**

1. S. Chary, "Theory and problems in Production and Operation Management" Tata McGraw-Hill
2. E. Buffa and R. K. Sarin, "Modern Production and Operation Management", Wiley India.
3. Martand Telsang, "Industrial Engineering and Production Management", S. Chand & Co.,
4. R. Pannerselvam, "Production and Operation Management", Prentice Hall of India.

**Course Code: INP554****Course: Lab Practice-1****L: 0Hrs. T: 0Hrs. P: 4 Hrs. Per week****Total Credits: 2**

Practical based on the theory of Operations Research and Statistical Quality Control.

Course Code: INT555-1

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Course : Automation in Production

Total Credits : 4

**Course Outcomes**

1. Students should be able to evaluate & Compare investment proposals for Automation Projects.
2. Students should be able to analyze & evaluate the performance of automated production lines based on production time, production rate and efficiency of line.
3. Students should be able to design part delivery system and evaluate the performance of automated assembly lines.
4. Students should be able to evaluate and select a suitable CNC/ Machining Centers for manufacturing a particular component.
5. Students should be able to use different codes & commands for preparing a CNC part programme and its execution.

**Syllabus**

Concept of automation, mechanization and automation, Principles and strategies of automation, Production economics. Flow lines, transfer mechanisms, analysis of transfer lines. Assembly lines, part delivery systems, analysis of assembly lines. Sensors, Actuators and other Control System Components.

Development of CNC Technology-Principles and classification of CNC machines, types of control, CNC controllers, information processing and storage. Part programming languages, manual programming, machine axis system, adaptive control. Selection of components for NC manufacturing, automatic tool changers.

**Reference Books :**

1. Automation in Production: Groover M.R, Tata McGraw Hill.
2. Numerical Control of Machine Tool: Yoram Koren and Ben-Uri J., Khanna Publication.
3. NC and CAM: Kundra and Rao, Tata McGraw Hill.
4. CAD/CAM: M. R Groover, Zimmers Jr., Tata McGraw Hill.
5. Computer Automated Manufacturing: Power J. Jr., Tata McGraw Hill.



Course Code : INT555-2

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Course : Financial Management

Total Credits : 4

**Course Outcomes :**

At the end of this course the students will be able to

1. Knowledge of Basics of Financial Management Concepts
2. Ability to appreciate the preferred capital and its cost.
3. Understanding of EBIT-EPS analysis, evaluation of various financing plans and important leverages
4. Understanding the concept of dividends and various dividend evaluation models
5. Understanding the operating cycle and other aspects of working capital management.
6. Ability to appreciate the importance of Capital Budgeting techniques like IRR, NPV and PI.

**Syllabus**

**Unit - I** Introduction to Financial Management, Concept of Business Finance, Finance Function, Scope, Organization, Responsibilities of Finance Executive, Goal and Objectives of Financial Management, Functional Area, Source of Financing - Long Term Sources, Shares, Debentures, Term Loans, Lease, Hire-Purchase, Retained Earnings, Public Deposits, Bonds, Short Term Sources, Bank Finance, Commercial Paper and Trade Credit, Bills discounting,

**Unit - II** Cost of Capital, concept, meaning, principal and Importance. Cost of different source of finance, weighted average cost of capital and factors affecting cost of capital.

**Unit - III** Capital Structure, meaning, concept of optimal capital structure, computation of leverages, Capital Gearing and Leveraging, EBIT-EPS Analysis.

**Unit - IV** Financing and Dividend Policies Decision - concept, determinant and factors affecting relevance and irrelevance concept. Dividend valuation models - Gordon, Walter & Modigliani - Miller models and stability of dividends.

**Unit - V** Working Capital Management, Concept of Working Capital, Significance, Types, Adequacy of working capital Factors affecting working capital needs, financing approaches of working capital, Methods of forecasting working capital requirement.

**Unit - VI** Time value of Money, Investment Decision-Capital Budgeting - Nature and Significance, Techniques of Capital Budgeting, Payback Method, Accounting Rate of Return, Internal Rate of Return, DCF, Net Present Value and Profitability Index.

**Textbook :**

1. Financial Management by R.P. Rustogi : Fourth Revised Edition; Taxman's Publication

**Reference Books :**

1. Financial Management by Khan and Jain, Tata McGraw Hill Publication
2. Financial Management by P.C.Tulsian, S Chand Publications.
3. Financial Management by R.P.Rustogi; Galgotia Publications
4. Financial Management by Ravi Kishore; Taxmann Publications





Course Code: INT555-3

Course : Marketing Management

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits : 4

**Course Outcomes**

1. Students will be able to understand concept of Marketing and model the marketing system.
2. Will be able to formulate form "P" of marketing and understand buyer behavior.
3. Methods of market forecast and demand potential estimate.
4. Will be able to understand market activities such as MIS, Market Research.

**Syllabus**

Changing business orientation, integrated marketing, customer satisfaction, definition of marketing management, basic marketing system model, e-commerce and Internet marketing. Marketing Environment: Marketing opportunity concept, economic, social, political and cultural environment, Duryer behavior and the four P's of marketing mix, brand preference. Measurement and Forecasting of Demand: Concept of Market Forecast and Market potential methods of estimating current demand, Chain ratio, Index of buying pinrer method, estimation of future demand, Survey of buyer intentions, Statistical analysis. Organizing for Marketing: Break up of marketing activities, organization for integrated marketing, Market information systems (MIS), internal accounting and intelligence systems, marketing research and decision making. Marketing Strategies : Product market matching, Product management, Product life cycles, innovations, Promotion strategies in advertising, personal selling, sales promotion and publicity. Price decisions: Reasons, Objectives and Methods; Price setting, Buyers reaction, demand elasticity of price, distribution trade off analysis, physical distribution methods, concept of level of service and Cost of services, overall marketing mix. Market Segmentation and marketing Control: Concept of segmentation, methods of segmentation, control of management over marketing subsystems, efficiency control, short and long controls

**Text Books :**

1. Modern Marketing: A Manual of Marketing, Salesmanship and advertising : Bombay, Himalaya Publishing House, 1990
2. Marketing Management Strategies and Progress: Guiltima J.P.& Paul, G. W. Singapore; McGraw Hill, 1985
3. Marketing Management: Philips Kotler.



Course Code: INT555-4

Course : Human Capital Management

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits: 4

**Course Outcomes :**

At the end of this course the students will be able to

1. Understand the roles and responsibilities of HR department in Industries
2. Have the knowledge to understand job analysis and design jobs.
3. Understand job evaluation and how to estimate HR requirements.
4. Be able to conduct recruitment and selection process
5. Be able to understand training methods and the concept of performance appraisal
6. Know to current trends in HRM

**Syllabus**

Introduction to HRM, Nature Scope Objectives, Functions and Importance of HRM. Evolution of the concept of HRM, HRM in India, Role of HR manager, HRM in India, HR practices in Industry. Job Analysis Design; Job Analysis Meaning; Uses, Methods and Process for collecting data for job analysis, Job Specification; Factors affecting techniques of Job Design, Techniques of Job Design. Job Evaluation and Human Resource Planning, Objective of Job Evaluation, Advantages and Limitations of Job Evaluation, Human Resource Planning, Concept and Need of Human Resource Planning. Process of Human Resource Planning. Recruitment and Selection, Factors affecting recruitment and selection, Sources of Recruitment, Selection Process, Methods of Interview, Tests, Induction Program, Problems of Induction. Training and Development. Performance Management, Objectives and Importance of Training, Process of Training and Development, Classification of Training methods/ techniques, Reasons for training, Performance Appraisal, Introduction to Performance appraisal, errors during appraisal. Employee Remuneration, Trends in HRM, Introduction to Compensation, Introduction to Strategic HRM, Balance Scorecard, Organization Citizenship behavior, HR audit, Competency mapping, Employee Engagement,

**Text book :**

1. Human Resource Management; Text & Cases ; K Ashwathappa McGraw Hill Publication.

**Reference Books :**

1. Human Resource Management ; Ninth Edition ; L. R. Wayne, Mondy, Robert M. Noe, Pearson Education.
2. A Textbook of Human Resource Management; C.B.Mamoria, S.V.Ganarkar, Himalaya Publishing House
3. Human Resource Management. R. Jyothi; Oxford University Press.



**Course Code: MET 556****Course : Research Methodology****L: 3Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 3****Course Outcomes :**

1. Students will be able to gain insights into different aspects of research
2. Student will be able to understand different data collection methods in research.
3. Student will be able to learn and understand the basics of data analysis tools and techniques.
4. Students will be able to understand the role of computers in research.
5. Students will be able to understand the documentation of research and report writing.

**Syllabus**

Meaning of Research, Research Methods versus Methodology Objectives of research, Motivation in Research, Types of Research, Research approaches, Significance of Research, Identification of a research problem, Criteria for selection of the problem, Defining the Research problem, Selecting the Problem ,Technique involved in defining a problem, Research Design: Need, features of a good design, research design concepts, Different research designs,

Literature survey and review: Need of review of literature. Data Collection: Meaning and importance of data, Sources of data, Methods of data collection, Collection of Primary Data; Observation Method, Interview Method, Data through Surveys and Questionnaires, Some Other Methods of Data Collection, Experimentation, Simulation. Data Analysis: Statistical analysis, Measures of central tendency, Measures of dispersion, Probability distributions: Binomial, Poisson, Uniform, Normal and Exponential, Hypothesis Testing, Procedure for Hypothesis Testing Confidence Interval, Test of Significance, Comparison of Two Proportions, Comparison of Means, Analysis of Variance (ANOVA), Basic principle of ANOVA, One way and two way ANOVA, Design of Experiments, Importance of experimental designs. Optimization of Model parameters, Application of optimization theory to modeling, Heuristic and met heuristic approaches like Fuzzy logic, Genetic Algorithm (GA), Simulated Annealing (SA), etc. Role of computers in Research : Introduction to spreadsheet application, features and functions, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts/ graph and other features, Use of MS Excel, Power Point, Use of statistical Analysis software. Report Writing and publication: Planning of Report Writing, Thesis writing, Formats of report writing, Types of Reports, Different steps in writing report, Formats of publications in Research journals

**Reference Books :**

1. Research Methodology- Methods and Techniques: Kothari C.P. (2004), 2/e, New Age International, New Delhi
2. Design and Analysis of Experiments: Angela Dean and Daniel Voss, Published by Springer- Verlag NewYork, In
3. Simulation Modeling and Analysis, 2nd ed.: Law, A. M., and W. D. Kelton, 1991, McGrawHill
4. Discrete event system simulation, 2nd ed.: Banks, J. J., S. Carson, and B. L. Nelson. 1996, Upper saddle river, New Jersey : Prentice-Hall.
5. Design and Analysis of Experiments, 5th ed.: Montgomery, Douglas C. (2007), (Wiley India)
6. Applied Statistics & Probability for Engineers: Montgomery, Douglas C. & Hunger, George C. (2007), 3/e, (Wiley India)

**Course Code: INT556****Course : Supply Chain Management****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. Student shall be able to understand the importance of Supply Chain Management (SCM).
2. Student shall be able to understand the forecasting and role of distribution network in SCM
3. Student shall be able to understand inventory management in SCM
4. Student shall be able to understand the supplier selection in SCM

The Objective, Importance of Supply Chain, Decision Phases in a Supply Chain, Drivers of Supply Chain Performance, The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Options for a Distribution Network, The Role of Network Design in the Supply Chain, Framework and Factors Influencing Network Design Decision, Models for Facility Location and Capacity Allocation, Warehouse functions, warehousing planning and cost reduction, The Role of Forecasting in a Supply Chain, Characteristics of Forecasts, Forecasting Methods, Lean supply chain management.

The Role of Cycle Inventory in a Supply Chain, Economies of Scale of Exploit Fixed Costs; Quantity Discounts, Managing Multi echelon Cycle Inventory, The Role of Safety Inventory in a Supply Chain, The Role of Transportation in a Supply Chain, Modes of Transportation and their Performance Characteristics, Transportation Infrastructure, The Role of Sourcing in a Supply Chain; In - House or Out source, Third and Fourth - Party Logistics Providers, Supplier Scoring and Assessment, Supplier Selection. Make versus buy.

**Reference Books :**

- 1) Sunil Chopra & Peter Meindl , "Supply Chain Management: Strategy, Planning and Operations", Person Prentice Hall
- 2) Janat Shah, " Supply Chain Management, : Text and Cases", Person Education
- 3) Paul Myerson, " Lean Supply Chain and Logistics Management", Mc Graw Hill

**Course Code: INT557****Course: Human Factors Engineering****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits:4****Course Outcomes :**

By end of this course the students should be able to:

1. Describe an expanded view of ergonomics
2. Students will be able to identify ergonomically related injuries that occur in workplace.
3. Students will be able to find and assure that the workplace fits the worker
4. Students will be able to put ergonomic assessments and solutions to practical use in the workplace.

**Syllabus**

The nature of Ergonomics: Scope, applications. Productivity Correlation, Human machine System. Principles of Ergonomics, Process and application of Ergonomics. Anthropometry: Structural and functional dimensions, collection of anthropometric principles in application of anthropometric data. Design of workplace, seat design. Information input and processing: Concept of information, human information processing model, memory, Design of displays, Design of controls, hand tools and devices, MSD- Carpel tunnel syndrome Work Physiology: Metabolism & heat regulation , Muscle Structure, energy cost of work load, physical work capacity, whole body fatigue, stresses and work load Environmental Factors: Heat exchange process. Methods of heat exchange, environmental factors influencing heat exchange. Zone of heat exchange, Noise level measurement. Physiological effects of noise, effect of noise on performance & communication, noise reduction & exposure limit, illumination, effect of light on performance, Glare.

**Text Books :**

1. Human factors Engg. & Design - Mark S. Sanders. Ernest J. Me McCormick : McGraw Hill International Editors
2. Ergonomics: Man in his working Environment -Murrell, K. Chapman and Hall London.
3. Human Factors Design Handbook -Wooden Vs. McGraw Hill New York.

**Course Code: INT558****Course : Maintenance Engineering****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. Student should be able to understand reliability concept and related models.
2. Student should be able to understand the features of maintenance system along with different Strategies.
3. Student should be able of planning, scheduling and cost management of maintenance activities.
4. Student should be able to performance measurement in maintenance.

**Syllabus**

Definitions of Reliability, failure data analysis, failure rate, failure density, MTBF, MTTF, Hazard models, Bath tub Curve, maintainability and availability, system reliability.

General Objectives, functions, organization and administration of maintenance system, maintenance and repair jobs, defect/failure list generation and failure analysis, maintenance strategies, condition monitoring, maintenance planning and scheduling, maintenance effectiveness, performance evaluation / indices, maintenance budgeting, costing & control, spare parts planning, recent trends in maintenance, Terotechnology.

**Text Books :**

- 1) Maintenance Engineering – Er Sushilkumar Srivastava, S chand.
- 2) Reliability Engineering- L. S. Srinath affiliated East- west Press Private Limited
- 3) Maintenance planning and control – Antony Kelly

**Reference Books :**

- 1) Reliability and Maintainability Engineering – Charles E. Ebeling, Tata McGraw Hill
- 2) Reliability, availability and maintainability : J.W. Foster, D.T. Philips and IR. Rogers., M/A Press.

**Course Code: INP559****Course : Lab Practice-II****L: 0Hrs. T: 0Hrs. P: 4 Hrs. Per week****Total Credits : 2**

Practicals based on the theory of Ergonomics and Computers and Database Management.

Course Code : INT560-1

Course : Materials Management

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits : 4

**Course Outcomes :**

1. Students will understand the objective and scope of material management.
2. Students will be able to understand the concept various cost involved in inventory control.
3. Students will be able to understand various purchase and production based inventory control models.
4. Students will be able to understand the vendor rating system, MRP, JIT, KANBAN etc.
5. Students will be able to understand various algorithms in inventory control.

**Syllabus**

Role of materials management techniques in material productivity improvement, Cost reduction and value improvement, Purchase management, Incoming material control, Acceptance sampling and Inspection, Vendor rating system, Inventory management, Various inventory control models, Material requirement planning systems, Discrete lot size techniques, Wangar and Whitin algorithm, Silver and metal algorithm, Algorithms for multi product lot sizing with constraint inventory management of perishable commodities, Design of inventory distribution systems, Inventory management in KANBAN and JIT.

**Text books :**

1. Materials Management by A.K.Chitale, R.C. Gupta, PHI Publication
2. Materials Management & Material handling : S.C. Sharma, Khanna Publications
3. Materials, Management An integrated approach, P.Gopal Krishnan and Mr. Sudarsan, PHI

Course Code : INT560-2

Course : Reliability Management

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits : 4

**Course Outcomes :**

1. Students will be able to understand the important of Reliability & its application.
2. Develop understanding of systems reliability and models.
3. Develop understanding of failure analysis, availability and maintainability concept.
4. Develop understanding of Failure / Repair Distribution and Parameter Estimation.

**Syllabus**

Basic Reliability Models, Reliability Function, Mean time to Failure, Hazard rate Function, Bath Tub Curve, Conditional reliability.

Constant Failure Rate Model: Exponential Reliability Function, Failure Modes, applications, the two parameter Exponential Distribution, Poisson process, Redundancy and the CFR Model. Time Dependant Failure Models, The Weibull Distribution, The Normal Distribution, System reliability.

Markov Analysis, Load-Sharing System, Standby Systems, and Degraded Systems.

Reliability specification and system Measurements, Reliability allocation, Failure analysis, System safety and Fault free analysis, Maintainability, Availability. Data Collection and Empirical Methods, Static Life Estimation.

Identifying Failure and Repair Distribution, Parameter Estimation, Relevant applications.

**Reference Books :**

1. An Introduction to Reliability and Maintainability Engineering : Charles E. Ebeling Tata McGraw-Hill publishing Company Limited
2. Reliability Based Design : S. S. Rao, McGraw Hill
3. Reliability Engineering : E. Balagurusamy, Tata McGraw Hill Publishing Co. Ltd.
4. Reliability Engineering : L.S. Srinath, East West Press.

Course Code : INT560-3

Course : Project Management

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits : 4

**Course Outcomes :**

At the end of this course the students will be able to

1. Make a proper project charter.
2. Plan and schedule a project activity
3. Demonstrate the ability to understand and use human resources and contracts project team
4. Evaluate the project performance
5. Ability to prepare the project audit report

**Syllabus :**

Introduction and concepts of project management life cycle, Establishing project scope time cost and performance goals, organizing human resources and contracting, organizing systems and procedures for project implementation, project direction, coordination, control and evaluation. Benefits of project evaluation, limitations of project evaluation, limitations and methods of project evaluation, Project Management Performance, Management Information System, Project Management Tools.

**Reference Books :**

1. Project Management : David Cleveland. Lewis Ireland, Tata McGrawHill.
2. Project Management : S. Chaudhary Tata McGraw Hill.
3. Guide to Project Management : Harold Kenzer Tata McGrawHill
4. Project Management : Jack Gido, James Clements; Cengage Learning.



Course Code : INT561

Course : Advanced Computation Technique

L: 3Hrs. T: 0Hrs. P: 0 Hrs. Per week

Total Credits : 3

**Course Outcome :**

At the end of this course the student should be able to

1. Apply Genetic Algorithm to solve the problems in Industrial Engineering
2. Apply advanced techniques like Artificial Neural Network, ant colony algorithm, particle swarm algorithm, Simulated Annealing method etc.
3. Develop solutions to real time industrial engineering problems using fuzzy logic

**Syllabus****Introduction**

Genetic algorithm mechanism, Appraisal of GA performance, Procedures and operations in GA search, Computer Implementation and applications, Neural Networks, Introduction to Multilayer Networks, recurrent networks, Learning Paradigms, Data Envelopment Analysis, Fuzzy Optimization, Soft Constraints, Approximate reasoning, Multi criterion, Developing expert systems using Fuzzy logic, Simulated Annealing, Metropolis Algorithm, Ant Colony Optimization, Particle Swarm Algorithm.

**Reference Books :**

1. Genetic Algorithms in Optimization and Machine Learning : D.E Goldberg, Addison Wesley Reading, MA, USA 1989.
2. Understanding Neural Networks & Fuzzy Logic: Basic Concepts and Application: Stamatios.V. Kartalopoulos, Prentice Hall of India New Delhi, 2002.
3. MultiobjectiveOptimisation using Evolutionary Algorithm : K. Deb Chichester 2002
4. Neural Networks, Fuzzy Logic and Genetic Algorithm; A synthesis and Applications :S. Rajashekharan, G.A Vijayalkshmi Pai, Prentice Hall of India, New Delhi 2003
5. An Introduction to Data Development Analysis, A Tool For Performance Management: SAGE Publications New Delhi 2003.

**Course Code: INT599-1****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Course : Quality Management****Total Credits : 4****Course Outcomes :**

Student shall be able to

1. To develop understanding of Quality concepts.
2. To apply QC tools and modern quality management tools.
3. To implement TQM concepts in manufacturing & Service sector.

**Syllabus :**

Evolution of product and service quality, TQM Frameworks, Contributions of Deming, Juran and Crosby, Customer focus, Costs of quality.

Leadership, Strategic quality planning, Employee involvement, Quality circles, PDCA cycle, 5S, Kaizen.

The seven traditional tools of quality and new QC tools, Control Charts, Process Capability, Concepts of Six Sigma Six sigma, Quality function Deployment (QFD), Taguchi quality loss function.

ISO 9000 Quality System, Documentation, Quality Auditing, ISO 14000, TQM Implementation in manufacturing and service sectors.

**TEXT BOOK :**

1. Dhale H. Besterfield, et al., " Total quality Management", Third Edition, Person Education Asia, Indian Reprint, 2006.

**References**

1. James R. Evans and William M. Lindsay, " The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi, L. and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd. 2006.
3. Janakiraman. B. and Gopal. R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
4. R.P. Mohanty and R.R. Lakhe, "TQM in the Service Sector" - Jaico Publishing House 2002.

**Course Code: INT599-2****L: 3Hrs. T: 0Hrs. P: 0 Hrs. Per week****Course : Optimization Techniques****Total Credits : 3****Course Outcomes :**

Students shall be able to

1. Use classical technique to get optimal solution for NLP
2. Solve nonlinear optimization problem using digital technique or geometric programming.
3. Use evolutionary algorithm for solving optimization problems.

**Syllabus**

Classical Optimization Techniques : Single and multi variable Optimization, Lagrangean function, Kuhn–Tucker Conditions. Nonlinear Programming I : One-Dimensional Minimization Methods: Unimodal Function, Dichotomous Search, Fibonacci Method, Golden Section Method, Quadratic Interpolation Methods, Quadratic Interpolation Method, Cubic Interpolation Method, Direct Root Methods .Nonlinear Programming II : Unconstrained Optimization Techniques: Univariate Method, Pattern Search, Method, Simplex Method, Steepest Descent (Cauchy) Method, Conjugate Gradient (Fletcher–Reeves) Method, Newton's Method, Quasi-Newton Methods, Davidon-Fletcher-Powell Method. Geometric Programming : Posynomial, Primal-Dual Relationship and Sufficiency Conditions, Degree of difficulty, orthogonality and normality conditions, 0 and 1 degree difficult problem. Modern Methods of Optimization : Genetic, Simulated Annealing. Particle Swarm Optimization, Ant Colony Optimization.

**Text book :**

1. "Engineering Optimization Theory and Practice", Fourth Edition, Singiresu S. Rao, JOHN WILEY & SONS, INC.

**Reference Books :**

1. Optimization theory and Methods: Non linear Programming - Wenyu Sun, Ya-Xiang Yuan, Springer
2. Linear & Non linear Programming - David G. Luenberger, Yinyu Ye, Springer
3. Non linear Programming - Anthony V. Fiacco, Garth P. McCormick, SIAM

**Course Code:** INT599-3**Course :** Fundamentals of Financial Management**L:** 3Hrs. **T:** 0Hrs. **P:** 0 Hrs. **Per week****Total Credits : 3****Course Outcomes :**

At the end of this course the students will be able to

1. Posses the Knowledge of Basics of Financial Management Concepts
2. Appreciate the preferred capital and its cost.
3. Understand the EBIT-EPS analysis , evaluation of various financing plans and important leverages
4. Understand the concept of dividends and various dividend evaluation models
5. Understand the operating cycle and other aspects of working capital management.
6. Appreciate the importance of Capital Budgeting techniques like IRR, NPV and PI.

**Syllabus****Unit -I**

Introduction to Financial Management, Concept of Business Finance, Finance Function, Scope, Organization, Responsibilities of Finance Executive, Goal and Objectives of Financial Management, Functional Area, Source of Financing – LONG TERM SOURCES - Shares, Debentures, Term Loans, Lease, Hire-Purchase, Retained Earnings, Public Deposits, Bonds, SHORT TERM SOURCES - Bank Finance, Commercial Paper and Trade Credit Bills discounting.

**Unit -II**

Cost of Capital, concept, meaning, principle and Importance. Cost of different sources of finance, weighted average cost of capital and factors affecting cost of capital.

**Unit III**

Capital Structure, meaning, concept of optimal capital structure, computation of leverages, Capital Gearing and Leveraging, EBIT-EPS Analysis.

**Unit IV**

Financing and Dividend Policies Decision-concept, determinant and factors affecting relevance and irrelevance concept. Dividend valuation models - Gordon, Walter and Modigliani- Miller models and stability of dividends.

**Unit V**

Working Capital Management, Concept of Working Capital Significance, Types, Adequacy of working capital, Factors affecting working capital, needs, financing approaches of working capital, Methods of forecasting working capital requirement.

**Unit VI**

Time Value of Money, Investment Decision-Capital Budgeting - Nature and Significance. Techniques of Capital Budgeting, Payback Method, Accounting Rate of Return, Internal Rate of Return, DCF, Net Present Value and Profitability Index.

**Textbook :**

1. Financial Management by R.P. Rustogi : Fourth Revised Edition; Taxmann's Publication

**Reference Books :**

1. Financial Management by Khan and Jain, Tata McGraw Hill Publication
2. Financial Management by P.C.Tulsian, S Chand Publications.
3. Financial Management by R.P.Rustogi; Galgotia Publications
4. Financial Management by Ravi Kishore; Taxmann Publications



**Course Code: INT651-1****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Course : Total Quality Management****Total Credits: 4****Course Outcomes :**

1. To develop understanding of Quality concepts.
2. To apply QC tools and modern quality management tools.
3. To implement TQM concepts in manufacturing & service sector.

**Syllabus**

Evolution of product and service quality TQM Framework Contributions of Deming, Juran and Crosby, Customer focus, Costs of quality.

Leadership, Strategic quality planning, Employee involvement, Quality circles, PDCA cycle, 5S, Kaizen.

The seven traditional tools of quality and new QC tools, Control Charts, Process Capability, Concepts of Six Sigma, Quality Function Development (QFD), Taguchi quality loss function.

ISO 9000 Quality System, Documentation, Quality Auditing, ISO 14000, TQM Implementation in manufacturing and service sectors.

**Text Books:**

1. Dale H. Besterfield, et al., "Total Quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2006.

**References :**

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. Janakiraman. B and Gopal. R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
4. R.P. Mohanty and R. R. Lakhe, "TQM in the Service Sector" - Jaico Publishing House 2002.

**Course Code : INT651-2****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Course : Value Engineering****Total Credits : 4****Course Outcomes :**

Students will be able to

1. Apply cost reduction techniques.
2. To evaluate various alternatives.
3. To prioritize functions of products.
4. To identify under value products.
5. To improve value of product.

**Syllabus**

Value engineering and its application in product design, Identification of major function and removal of poor value functions in a product, Types of value Effects of functions and cost on value, Life cycle of product and value engineering, Steps in value engineering, Methodology in value engineering, Fast diagram, Matrix method and other approaches in value engineering, Evaluation of value alternatives, Case studies in value engineering.

**Text Books:**

1. Value engineering in Manufacturing: American Society of Tool & Manufacturing Engineers, New Jersey, Prentice Hall incorporated, 1967.
2. Cost Engineering Analysis: Park, W.R. New York, John Wiley & Sons, 1973
3. An Introduction to Value Engineering: L. D. Miles

Course Code: INT651-3

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Course : System Design Engineering

Total Credits : 4

#### Course Outcomes :

1. Students will develop understanding of system Concepts, Component, properties.
2. Will be familiarized with process of design of system.
3. Will be able to understand the concept of system reliability, maintainability,

#### Syllabus

Types of information :Operational, tactical, strategic and statutory, need of information systems, management structure, requirements of information at different levels of management, functional allocation of management, requirements of information for various functions, qualities of information. Requirements determination: Requirements specifications, feasibility analysis, final specifications, hardware and software study, system design, system implementation, system evaluation, system modification. Role of systems analyst: attributes of a systems analyst, tools used in system analysis. Strategies: methods, documenting study, system requirements. Specification from narratives of requirements to classification of requirements as strategic, tactical, operational and statutory. Deciding project goals: examining alternative solutions, cost benefit analysis, quantifications of costs and benefits, payback period, system proposal preparation for management, parts and documentation of a proposal, tools for prototype creation.

Data flow diagrams: Case study for use of DFD, good conventions, leveling of DFDs, leveling rules, logical and physical DFDs, software tools to create DFDs. Procedure specifications in structured English: Examples and cases, decision tables for complex logical specifications, specification oriented design vs procedure oriented design. Entity relationship model: E-R diagrams, relationships cardinality and participation, normalizing relations, various normal forms and their need, some examples of relational data base design.

#### Text Books :

1. Systems Engineering and Analysis (5th Edition): (Prentice Hall International Series in Industrial & Systems Engineering) by Benjamin S. Blanchard and Wolter J. Fabrycky (2010)
2. Systems Engineering Principles and Practice : (Wiley Series in Systems Engineering and Management) by Alexander Kossiakoff, William N. Sweet, Sam Seymour and Steven M. Biemer (2011)
3. System Engineering Management: (Wiley Series in Systems Engineering and Management) by Benjamin S. Blanchard (Jul 28, 2008)

Course Code: INT652-1

L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week

Course : Computers and Database Management

Total Credits: 4

#### Course Outcomes :

1. Understand the concepts of Database, RDBMS and software applications in industrial engineering.
2. By the completion of the course the student should be able to
  - a. Apply the concepts of Database, DBMS and software applications in industrial engineering.
  - b. Design databases using RDBMS Tools.
3. To realize the importance of information for decision making in the organizing.
4. Develop Databases and computer programs for the solution of engineering Problems

#### Syllabus

Information concepts, System concepts, Examples of Information systems, Concept of General System Theory and their applications to Information Systems. Definition of data, information and knowledge . Introduction to Transaction processing systems, management information system, Decision Support Systems etc. Electronic Commerce and its impact on Business Strategy. ERP

Introduction to databases and relational database management systems. Design and development of databases, What is a DBMS, File versus Database, uses of DBMS, Different Data models, Levels of Abstraction, introduction to Data Independence and Concurrency Control. Structure of a DBMS.

The Entity-Relationship Model : Entity, Entity Set, Relationship, Constraints, attributes, data flow diagrams and ER diagrams, Normalizing relations; Data input methods; Structured Systems Analysis and Design.

Introduction to SQL, DDL Commands, DML Commands, DCL Commands, Function Of SQL Plus , Select Statement with all options, Creating, Dropping and Altering Tables, Types of Keys, Relational Algebra, Projection, Selection, Union, Intersection, Set-Difference, Joins, Division,

Management of database users and security. Introduction to front-end and its connectivity with the database. Safety of data, evaluation of database system to avoid fraud.

#### Reference Books :

1. An Introduction to Database Systems: C. J. Date, Addison-Wesley, 2000
2. Management Information System: Gordon B. Davis and M.H. Olson, Tata McGrawHill.
3. Database system concept: Henry Korth and S. Sudarshan, Tata McGraw Hill. Database Management Systems, 3rd Edition
4. by Raghu Ramakrishnan, Johannes Gehrke Tata McGrawHill
5. Complete reference Oracle 10g: Oracle Press.

**Course Code: INT652-2****Course : Manufacturing Economic Analysis****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. To make students understand the concept of Time Value of Money.
2. To make students understand the various costs and their application in manufacturing scenarios.
3. To make students understand Capital budgeting, and be able to compute rate of returns for various alternatives.
4. To make students understand Financial Accounting, its principle , interpretations of financial statements using various financial ratios.

**Syllabus**

The principal and use of economic analysis in the engineering practices, Time Value of Money : Nominal and effective interest rates, discrete and continuous compounding. Role of engineering economy in the decision making process, Discounted cash flow analysis, evaluation of investment alternatives, evaluation of alternatives with equal and unequal lives, the effects of income tax on economic studies, Replacement analysis.

**Capital budgeting :**

Rate of return computation & Cost of Capital; Payback period; Present worth, Annual Worth and capitalized cost evaluation; Benefit/Cost ratio evaluation.

**Financial accounting & Costing :**

Accounting Principles, Financial Statements, Interpretation and use of accounting information. Cost Accounting, Cost control, Analysis of cost, fixed, variable and semi variable cost, Break-even analysis, CVP Analysis, Marginal and absorption costing, Depreciation: Concepts and Computational Models. Theory of Firm as an owner and as a Producer-Economics of scale-Market Models-Production Function

**Reference Books :**

1. Engineering Economy: Theusen H. G. and others Prentice Hall of India
2. Engineering Economy: William G. Sullivan, Prentice Hall
3. Engineering Economy: Leland Blank and Anthony Tarquin, McGraw Hill
4. Engineering Economy: De; Garmo PE., MacMillan Publication
5. Cost Accounting: Jawaharlal, Tata McGraw Hill
6. Advanced Accounts Volume II: M.C. Shukla, TS. Grewal, S. C. Gupta, S. Chand and company
7. Cost Accounting, Principles & Practice: Jain Narang, PHI

**Course Code: INT652-3****Course : Business Communications****L: 4Hrs. T: 0Hrs. P: 0 Hrs. Per week****Total Credits : 4****Course Outcomes :**

1. To make students realize the importance of communication.
2. To prepare for making effective communication.
3. To prepare for group discussion & Personnel Interview.
4. To be able to write Business letters, Report etc.

**Syllabus**

Introduction, importance of communication, process of communication, types of communication, Interpersonal and intrapersonal communication, basic communication skills, barriers to communication, overcoming the barriers in communication, Effective verbal communication, public speaking, oral presentation, non-verbal communication, telephonic conversation. Group behavior and group dynamics, group discussion, types of interviews, facing the personal interview, meetings, video conferencing Effective written communication, reports, memos, business letters. Communication through emails.

**Text Books :**

1. Communication for Professional Engineers: Bill Scott, Thomas Telford Ltd., 1984
2. Technical Writing: John M. Lannon, Little Brown and Co. 1985
3. The element of Style: 3d edition., Willianl StrunkJr., Macmillan Publishing Co. 1979

Course Code: INP653  
L: 0Hrs. T: 0Hrs. P: 3 Hrs. Per week

Course : Project Phase-I  
Total Credits : 6

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**Project Phase :**  
Seminar/research work based on some topic related to Industrial Engineering



Course Code: INP654  
L: 0Hrs. T: 0Hrs. P: 6 Hrs. Per week

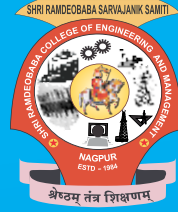
Course : Project Phase-II  
Total Credits : 12

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**Project Phase II :**  
Seminar/research work based on some topic related to Industrial Engineering







# SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR

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