



*References:*

1. *HARRY NYSTROM, " Creativity and innovation", John Wiley & Sons, 1979.*
2. *BRAIN TWISS, " Managing technological innovation", Pitman Publishing Ltd., 1992.*
3. *HARRY B.WATTON, " New Product Planning ", Prentice Hall Inc., 1992.*
4. *P.N.KHANDWALLA - " Fourth Eye (Excellence through Creativity) - Wheeler Publishing ", Allahabad, 1992.*
5. *I.P.R. Bulletins, TIFAC, New Delhi, 1997.*

**GE037 Intellectual Property Rights (IPR)****3 0 0 100****1 . UNIT I 5**

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

**2 . UNIT II 10**

IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.

**3 . UNIT III 10**

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT).

**4 . UNIT IV 10**

Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

**5 . UNIT V 10**

Case Studies on - Patents (Basumati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

**Total No of periods: 45**

*TEXT BOOK*

*1. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.*

*REFERENCES*

- 1. Eli Whitney, United States Patent Number : 72X, Cotton Gin, March 14, 1794.*
- 2. Intellectual Property Today : Volume 8, No. 5, May 2001, [www.iptoday.com].*
- 3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707\_gibbs.html.*

**1 . UNIT I 9**

Historical Background - Constituent Assembly of India - Philosophical foundations of the Indian Constitution - Preamble - Fundamental Rights - Directive Principles of State Policy - Fundamental Duties - Citizenship - Constitutional Remedies for citizens.

**2 . UNIT II 9**

Union Government - Structures of the Union Government and Functions - President - Vice President - Prime Minister - Cabinet - Parliament - Supreme Court of India - Judicial Review.

**3 . UNIT III 9**

State Government - Structure and Functions - Governor - Chief Minister - Cabinet - State Legislature - Judicial System in States - High Courts and other Subordinate Courts

**4 . UNIT IV 9**

Indian Federal System - Center - State Relations - President's Rule - Constitutional Amendments - Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

**5 . UNIT V 9**

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens - Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

**Total No of periods: 45**

**TEXT BOOKS**

1. *Durga Das Basu, " Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.*
2. *R.C.Agarwal, " (1997) Indian Political System ", S.Chand and Company, New Delhi.*
3. *Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.*
4. *K.L.Sharma, " (1997) Social Stratification in India: Issues and Themes ", Jawaharlal Nehru University, New Delhi.*

**REFERENCES**

1. *Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.*
2. *U.R.Gahai, " (1998) Indian Political System ", New Academic Publishing House, Jalaendhar.*
3. *R.N. Sharma, " Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.*
4. *Yogendra Singh, " (1997) Social Stratification and Charge in India ", Manohar, New Delhi.*

**1 . INTRODUCTION 5**

Special and comparative features of German with English, Hindi and Tamil - German Alphabets, pronunciation.

**2 . THEMA 10**

Name, Land Wohnort - Studium, Beruf - Familie, Geschwister, Alter - Tagesablauf , termine - Einladung - Stellensuche, Berufswahl - Einkauf.

**3 . GRAMMATIK 10**

Personalpronomen, Verb, Wortstellung, Ort - Possessivpronomen, Verb - 'Sein' - Verb - 'Haben', Unbestimmter Artikel, Negation - 'Nicht' - 'Kein' - Zeit, Bestimmter Artikel, Starke Verben - Trennbare Verben, Imperativ - Modal Verben - Akkusativ.

**4 . UEBUNGEN 10**

Partner uebungen - Schriftliche Uebungen - Aussprache Uebungen - Kontrollue bungen - Text generation.

**5 . DIALOGUE 5**

Oral - Written.

**6 . GLOSSARY 5**

Technical Words.

**7 . TUTORIAL 15**

**Total No of periods: 60**

*Text Book:*

*1. LERNZIEL DEUTSCH (Deutsch als Fremdsprache) - Grundstufe 1 from Max Hueber varlag.*



*Text Book:*

*1. LERNZIEL DEUTSCH (Deutsch als Fremdsprache) - Grundstufe 1 from MAX Hueber Verlag.*

**1 . 9**

Introduction to Japanese Alphabets - Hiragana, Katakana and Kanji - group 1,2,3 & 4 Syllabus - Writing Practice - Pronunciation - word Order - Greetings - Receiving a visitor and exchange of pleasantries - Kanji Practice.

**2 . 9**

Basic structure of sentences - classification of verbs - Polite form of verbs - irregular verbs - Particle-E - Time expressions - question sentences - Japanese numerals - Kanji practice.

**3 . 9**

Classification of particles - Ga, Ka, Wa, O, E, Ni etc - aural comprehension - reading comprehension - noun -1 Wa, noun -2 desu - Demonstrative pronouns - kore, sore , are and dore - kono, sono, ano and dono - kochira - sochira - achira and dochira - particle - No, kara, ni and de - question - itsu - conversational grammar - soo desu ka - Na, I adjectives perfect and imperfect - question words - Doo and ikaga - particle - To, ne and yo - Kanji practice.

**4 . 9**

Desu as a substitute for a verb - demonstrative pronouns sono and sore - Group 1 particles - de, O, Made and Ka - conjunction - soshite - Question words - dare, nani, doko, itsu, dore, dochira, doyatte, ikutsu, ikura - Words for degrees - gurai or kurai - Phrase - Saa - anoo - numerals - counters and numbers - humble form of desu and arimasu - Kanji practice.

**5 . 9**

Verbs ending in-te or de - classification of Te forms and Masu forms - verb modifiers - koo, soo, aa and doo - Set phrase - Onegaishimasu - Sumimasen - Adverbs - Mazu, sore kara and saigo ni - formation of the Te form of I adjective and desu - kanji practice.

**Total No of periods: 45**

*Text Books:*

1. *OOTSUBO et al - " A Course in Modern Japanese ", Vol.1, 1983, The University of Nagoya Press, Japan.*
2. *SHIYO SUZUKI and IKUO KAWASE - Nihongo Shoho text book with audio tapes, 1981.*
3. *YAN - SAN Serial - Video tapes, Japan.*

<b>1 .</b>	<b>9</b>
Demonstrative Pronouns: Are - Interjection: Ee - Quoted Sentences - omoimsu - Non polite form of verbs - Group 1 ending in -ert or iru, group 2 verbs ending in - u - Non polite forms of - I - adjectives -non polite form of desu,deshoo,daroo - Suffic - Sugiru - expression of reason - tame (ni) - Counters: - Hon and - Do - Kanji practice.	
<b>2 .</b>	<b>9</b>
Negative - Te - form of verbs -I adjectives - Permission and prohibition - te mo desuka and - te wa ikemasen ka - Na - adjectives - suki and kirai - Verbs:Itadaku - Conjunction - Nagara - Phrase - No koto na n desu ga - usage of chotto - kanji practice.	
<b>3 .</b>	<b>9</b>
Noun modifiers - Quoting modifier - Suffix - Kata - sa and me - Particles - Made ni and dake - te form of verb and iru/imasu - noun - Uchi - Eba form of verbs - Kanji practice.	
<b>4 .</b>	<b>9</b>
Potential sentences - group 1 verbs - group 2 verbs irregular verbs - Nouns - Tsumori and Hazu - Adverbs: Moo and Made - Form of address: moshomoshi - Expression - Ee - verbs: Naru and suru - Particles - De and ka - kanji practice.	
<b>5 .</b>	<b>9</b>
Comparative sentences - no hoo ga and yori - Negative comparative sentences - Negative request - Adverbs of extent - Konna ni, sonna ni and anna ni - Te form of transitive verb and - arul - Passive sentence - neutral passive sentence - technical vocabulary related to Engineering and Technology - Preparation of technical reports.	
<b>6 . TUTORIALS</b>	<b>15</b>

**Total No of periods: 60**

*Text Books:*

1. *OOTSUBO ET AL - " A Course in Modern Japanese ", Vol.II, The University of Nagoya Press, Japan, 1983.*
2. *SHIYO SUZUKI and IKUO KAWASE - Nihongo Shoho text book with audio tapes, The Japan Foundation, Tokyo, Japan, 1981.*
3. *YAN - SAN Serial - Video tapes, Japan.*

<b>1 .</b>	<b>9</b>
Alphabets - Pronunciation - Masculine and Feminine Genders only - Numbers - Indefinite and definite articles - plurals - Verbs to be and to have.	
<b>2 .</b>	<b>9</b>
Present tense - Affirmative, interrogative and negative sentences - Adjectives - Adverbs - Prepositions - Possessive Pronoun - Personnel Pronoun - Indirect Object.	
<b>3 .</b>	<b>9</b>
Group I verbs - Conjugations - Present, Past compound, Simple past and future tenses - Singular & Plural - Masculine and Feminine - adjectives and adverbs.	
<b>4 .</b>	<b>9</b>
Group II Verbs - Conjugations- Present, Past compound, simple past and future tenses - Singular and Plural - Masculine and Feminine - adjectives and adverbs.	
<b>5 .</b>	<b>9</b>
Pronomial verbs - Present, Past compound, Simple past and future tenses - Singular and Plural - Masculine and Feminine - adjectives - adverbs - Dialogue - Glossary.	
<b>6 . TUTORIAL</b>	<b>15</b>

**Total No of periods: 60**

*Text Books:*

1. MAUGER. G - *Course de Langue et de - Civilization Francaises*, HACHETTE -PARIS, 1986.
2. DOMINIQUE BERGER and REGINE MIRIEUX, *Cadences, Method de Francais Didier*, Paris, 1994.

*References:*

1. DENIS GIRARD, *French to English, English to French Dictionary*, Cassell - Mac Millan, 1981.

**HS040 Technical French II****3 1 0 100****1 . 9**

Group III Verbs - Conjugations - Adjectives - Adverbs - sentences - present - past compound - Simple past - future.

**2 . 9**

Comparative, superlative sentences - recent past - immediate future - grammatical analysis.

**3 . 9**

Translation from English to French - Translation from French to English - Texts from Physics and Chemistry.

**4 . 9**

Translation from English to French - Translation from French to English - Texts from Basic Engineering.

**5 . 9**

Report writing and translation from English to French - Translation from French to English - Letter Writing - Dialogue - Glossary.

**6 . TUTORIALS 15****Total No of periods: 60**

*Text Books:*

1. MAUGER, G - *Cours de Langue et de - Civilization Francaises*, HACHETTE - PARIS, 1986.
2. DOMINIQUE BERGER and REGINE MIRIEUX, *Cadences Methods de Francais*, Didier, Paris, 1994.

*References:*

1. CENTRE D'ETUDES FRANCAISES, " *Functional French for Scientists and Technologists* ", Jawaharlal Nehru University, New Delhi, 1986.
2. J.O.KETTRIDGE " *Dictionary of Technical terms and phrases Vol 1 & 2* ", The Gresham Press, Surrey, Great Britain, 1980.

**1 . LISTENING 7**

Listening comprehension-listening for specific information-note-taking-use of charts and diagrams.

**2 . SPEAKING 7**

Defining-describing objects-describing uses/functions-comparing-offering suggestions-analysing problems and providing solutions-expressing opinions (agreement/disagreement) predicting-expressing possibility/certainty-framing questions-providing answers-pronunciation practice (word stress).

**3 . READING 12**

Skimming-scanning-detailed reading-predicting content-interpreting charts and tables-identifying stylistic features in texts - evaluating texts-understanding discourse coherence-guessing meaning from the context- note - making / transferring information.

**4 . WRITING 12**

Sentence definition-static description-comparison and contrast-classification of information-recommendations-highlighting problems and providing solutions-formal and informal letter writing-using flow-charts/diagrams-paragraph writing-editing.

**5 . FOCUS ON LANGUAGE 7**

Word formation with prefixes and suffixes-discourse markers and their functions-degrees of comparison-expressions relating to recommendations and comparisons-active and passive voice-antonyms-tense forms-gerunds-conditional sentences-modal verbs of probability and improbability-acronyms and abbreviations - compound nouns and adjectives-spelling-punctuation.

**6 . PRACTICE IN LANGUAGE LAB 15**

Pronunciation practice - word stress - sentence stress - Listening comprehension - discussion - interpretation of visuals.

**Total No of periods: 60**

*Text Books:*

1. "*English for Engineers and Technologists* ", Volume I. Authors : *Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd., 1990.*

*References:*

1. *Narayanaswami, V.R. Strengthen Your Writing, Orient Longman Ltd., Chennai 1996 (Revised Edition)*
2. *Pickett and Laster, Technical English, Writing, Reading and Speaking, New York Harper and Row Publications.*
3. *Swan, Michael, Basic English Usage, Oxford University Press, 1984.*

**1 . LISTENING 7**

Listening comprehension - listening for specific information - note-taking and using non-verbal devices.

**2 . SPEAKING 7**

Describing processes-stating purpose-offering opinions, suggestions and recommendations-summarizing-reporting-free discussion of chosen topics-pronunciation practice (word stress, consonant clusters-homonyms)

**3 . READING 12**

Skimming-scanning-note -making-understanding the organisation of texts discourse cohesion-predicting and evaluating content-evaluating style-inferring meaning-study reading-interpreting tables, flow-charts.

**4 . WRITING 12**

Extended definition-process description-cause and effect analysis-stating choice and justifying it -safety instructions-check list-letter of application-data sheet/resume.

**5 . FOCUS ON LANGUAGE 7**

Word formation-synonyms-prepositions-adverbs-passive voice-sequence words/discourse markers-connective adverbs-numerical expressions-expansion of abbreviations-rules for writing SI units-language of instructions, check-lists, causes and effects, purpose and means-indefinite adjectives of number and quantity-spelling and punctuation.

**6 . PRACTICE IN LANGUAGE LABORATORY**

Pronunciation practice - listening comprehension - discussion - interpreting and reporting from visual inputs.

**7 . TUTORIAL 15****Total No of periods: 60**

*Text Books:*

1. *" English for Engineers and Technologists ", Volume II, AUTHORS :Humanities and Social Science Department, Anna University, Published by Orient Longman Ltd.,1990.*

*References:*

1. *Swales, John.M. and Christine B Feak, "Academic Writing for graduates students", The University of Michigan Press, USA, 1994.*
2. *Goddard, Ken - " Informative Writing - Your Practical Guide to Effective Communication ", Cassell Publication U.K. 1998.*
3. *Cutts, Martin " The Plain English guide-How to write clearly and Communicate Better ", Oxford University Press, New Delhi, 1995.*

**1 . UNIT I 22**

ORAL COMMUNICATION - Practical use of language in simulated real - life situations through role playing - social skills - interaction with employers, peers and subordinates - Group dynamics - Listening techniques - Phonological aspects of language use - pronunciation, stress and intonation.

Introducing oneself and others, narrating events - Making telephonic conversation - Making requests, Asking questions, Making recommendations using modal verbs, Expressing causal relations with suitable discourse markers, Giving instructions using imperatives, Expressing purposes and functions, obligation and preferences, Accepting offers and Counselling, Interpreting advertisements, Describing processes using sequential expressions. (Lecture:8, Practicals 14)

**2 . UNIT II 12**

Presenting one's ideas at meetings and conferences, Making extempore talks, Public speaking, Body language, Strategic competence, Use of audio - visual aids and multimedia presentations. (Lecture : 6, Practical 6)

**3 . UNIT III 8**

Technical Writing - the structure of organised writing - paragraph writing, coherence, cohesion (use of Discourse Markers) and punctuation, Use of titles, nonverbal devices - Layout - Revision strategies - Reading techniques.

Letter Writing: - Personal/Informal letters: Letters to family members and friends Business / Formal letters: Letters thanking the recipients, announcing functions, extending invitations, congratulating associates on important occasions, letters of application (Resumes), apology and complaint, letters to the editor. (Lecture:8, Practical : 0)

**4 . UNIT IV 8**

Report Writing: - persuasive, explanatory, argumentative and informative, Writing agenda, minutes, memos, project proposals and checklists.

(Lecture : 8, Practical 0)

**5 . UNIT V 10**

Grammar - study of grammatical items in contexts. Nouns, pronouns, adjectives, comparative adjectives, adverbs, gerund, prepositions, voice, tenses, 'if clauses, direct and indirect speech (reporting verbs), concord Vocabulary - Synonyms, antonyms, homonyms, homophones, hyponyms, affixes, reference words, phrasal verbs and prepositional phrases. (Lecture:10, Practical : 0)

**Total No of periods: 60**

*Text Books:*

1. *Doff, Adrian and Jones, Christopher, Language in Use: Classroom Book (Intermediate level). Cambridge: CUP. 1994 (2 audio cassettes).*
2. *Dr.V.Chellammal, Learning to Communicate - a resource book for Engineers and Technologists. Coimbatore: Kamakhya Publications 2002 (1 audio cassette)*

*References:*

1. *Sung, Abraham. 330 more Model Letters for all occasions Malaysia-Minerva Publications. 2002.*
2. *Bentley, T.J. Report Writing in Business: The Effective Communication of Information. New Delhi: Viva Books Pvt.Ltd., 2001*
3. *Vivanilam, J.V. More Effective Communication: A Manual for Professionals. New Delhi: Response Books. 2000*
4. *Michael, V.P.Communication and Research for Management. Mumbai: Himalaya Publishing House 2001.*
5. *Nauheim, Ferd. How to Write Business Letters. New Delhi; Crest Publishing House 2000.*
6. *Mohan, Krishna, Meera Banerji. Developing Communication Skills. New Delhi: Macmillan 1991.*
7. *Denny, Richard. Communicate to Win. New Delhi: Kogan Page 2002.*

**1 . INTRODUCTION 7**

Variational formulation-General field problems in Engineering-Modelling-Discrete and Continuous Models-Characteristics-The relevance and place of finite element method. Boundary and initial value problems-Gradients and Divergence theories-Functionals-Variational calculus-Variational formulation of B.V.P-The method of weighted residuals-The Ritz-Galerkin, relaxation and finite difference method.

**2 . FINITE ELEMENTS FORMULATION OF ONE DIMENSIONAL PROBLEM 12**

One dimensional second order equations-discretization of domain in to elements-Generalized coordinate approach-Stiffness matrix-Extension of the method to fourth order equation, time dependant problems and their solutions-Examples from heat transfer, fluid flow and solid mechanics

**3 . FINITE ELEMENTS FORMULATION OF TWO DIMENSIONAL PROBLEM 10**

Second order equation involving variational formulation-Triangular elements and Quadrilateral elements-CST and LST models-Convergence criteria for chosen models-Element matrices and vectors-Solution techniques-Extension to three domain problem, Axisymmetric problems-Example from metal forming and metal cutting

**4 . ISOPARAMETRIC ELEMENTS OF FORMULATION 10**

Natural coordinate in 1, 2 and 3 dimensions-Use of area coordinates for triangular elements in 2 dimensional problems-Isoparametric elements in 1,2 ,3 dimensional, Numerical integration.

**5 . SOLUTION OF LARGE SYSTEM OF EQUATIONS 6**

Sparse and banded matrices-Memory requirements-Cholesky decomposition-Forward and backward substitution procedures-Gaussian elimination techniques-Eigen value problems-Iteration concepts.

**Total No of periods: 45**

*References :*

1. *T.R CHANDRUPATLA and A.D.BELEGUNDU, Introduction to Finite Elements in Engineerin, Prentice Hall of India, 1997.*
2. *S.S.Rao, The finite element method in Engineering Pergaman process, 1993.*
3. *Segeriend L.J.Applied finite element analysis, John Wiley and Sons, Inc 1989.*
4. *Reddy J.N., An Introduction to the Finite Element method, McGraw Hill, International Student Edition, 1990.*
5. *Rajasekaran.S., Numerical methods for Initial and Boundary Value problems, Wheelers and Co., Pvt Ltd. 1987.*



*Text Book :*

*1. Irapohe, Object Oriented Programming using C++, Addison Wesley, 1997.*

*References :*

- 1. Peter Wad, Object Oriented Programming, Prentice Hall , 1993.*
- 2. Gregory Heilmann, Data Structures, Algorithms and Object Oriented Programming, McGraw-Hill, April 1996.*
- 3. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley, 2nd Edition, 1991.*
- 4. Timothy Rommetake, Introduction to C and C++ for Technical Students, Jan 1998.*



*Text Book :*

*1. Biren Prasad, Concurrent Engineering Fundamentals VOL II, Prentice Hall, 1997.*

*References :*

- 1. Karl.T Ulrich, Stephen D Eppinger, Product design and development, McGraw Hill, 1994.*
- 2. Donald E. Carter, Concurrent Engineering, Addison Wesley, 1992.*
- 3. James G. Bralla, Hand Book of Product Design for Manufacturing, McGraw Hill, 1986.*
- 4. Paul, Beitz, Engineering Design, Springer Verlag, 1992.*

**1 . PRINCIPLES OF AUTOMATIC CONTROLS 11**

Open and closed loop system in machine tools-advantages of closed loop system-block diagram representation of physical systems-mechanical, pneumatic and electronic systems.

**2 . COMPUTER CONTROL SYSTEMS 11**

Computer peripherals-data logger-direct digital control supervisory computer control-programmable controller-functions of programmable controller.

**3 . DRIVE SYSTEMS IN MACHINE TOOL 12**

Drives for CNC Machine-ball screw mechanism-electrical, hydraulic, pneumatic types-synchro, resolver, servomotors,amplidyne-monitoring and diagnostic strategies in machine tools-self diagnostic methods.

**4 . ADAPTIVE CONTROLS IN MACHINE TOOLS 11**

Definition-types-application-position measuring devices-potentiometers-industry-diffraction gratings-digitisers and encoders.

**Total No of periods: 45**

*Text Book :*

1. *HandBook of machine tool, Weck, Vol.3, John Wiley & sons, 1990.*

*References :*

1. *Martin S.J.Numerical control of machine tools, ELBS, 1974.*

2. *Ravon, Automatic control Engineering, McGraw Hill, 1976.*

3. *Niebel, Modernmanufacturing process engineering, McGraw Hill, 1989.*

**1 . INTRODUCTION 9**

Basic concepts of systems-Elements of systems-concept of simulation-simulation as a decision making tool-types of simulation-system modelling-types of modelling

**2 . RANDOM NUMBERS 11**

Probability and statistical concepts of simulation-pseudo random numbers-methods of generating random numbers-Discrete and continuous distributions-Testing of random numbers-sampling-simple, random and simulated.

**3 . DESIGN OF SIMULATION EXPERIMENTS 8**

Problem formulation-Data collection and reduction time flow mechanism-Key variables-Logic flowcharts starting condition-Runsize-Experimental design consideration-output analysis and interpretation, validation-application of simulation in industries, engineering and scientific organisation.

**4 . SIMULATION LANGUAGE 7**

Use of digital computer in simulated sampling-comparison and selection of simulation languages-Analysis-study of any simulation language-Modification of simulation models using simulation language.

**5 . RECENT ADVANCES AND CASE STUDIES/MINI PROJECT 10**

Development of simulation models using simulation languages studied for systems like queuing systems-production, inventory, maintenance and replacement systems-Investment analysis and network.

**Total No of periods: 45**

*Text Book :*

*1.R.E. Shannon, Systems simulation, the art and science, Prentice Hall, 1993.*

*1. Jerry Banks and John S.Carson, Discrete event system simulation, Prentice Hall, 1991.*

*2. John H. Mize and J.Grady cox, Essentials of simulation-Prentice Hall, 1989.*

*3.Thomas.J.Sehriber, Simulation using GPSS, John Wiley, 1990.*

*4.Jeffrey, L.Written, Lonnie D.Bentley and Victor. M.Barice,  
System Analysis and Design Methods-Galgolias Publications-1995.*

**PR039 Product Design and Process Engineering**

**3 0 0 100**

**1 . INTRODUCTION 9**

The design processes-selection of the right product-market research-factors preparatory to design-market development-product life cycle.

**2 . CRITERIA FOR PRODUCT DESIGN 9**

Functional Design-aesthtic design-quality, durability &reliability in design-Design for Manufacture-Optimum design.

**3 . COST AND PRODUCT DEVELOPMENT 9**

Estimation of production cost-cost reduction methods-value engineering-simplification, standardisation & diversification.

**4 . ANALYSIS & REDESIGN 9**

Critical analysis and value enhancement of typical products-Introduction to Business Process Reengineering(BPR) Methodology & steps to implement-BPR.

**5 . FORM DESIGN 9**

Casting design-welding design-metal forming design-comparison of different methods-cost analysis.

**Total No of periods: 45**

*Text Book :*

1. S.W. Jones, *Product design and process selection, Butter worth Publicaiton, 1973.*

*References :*

1. Benjamin W. Niebel and Allan B.Doaper, *Product design and process engineering.*

2. James.G.Bralle *Hand book of product design, McGraw Hill book co, 1986.*

3. M.S.Jayaraman, *etal, Business Process reengineering, Tata Mc Graw Hill, 1996.*

**PR040 Management of Systems**

**3 0 0 100**

**1 . PRINCIPLES AND FUNCTIONS OF MANAGEMENT 9**

Overview of purpose and principles of Management planning-objectives-strategies and policies-Decision making-organising-Leadership-Communication-Control.

**2 . BEHAVIOURAL SCIENCE 10**

Organisational behaviour-Leadership-Delegation-Managing change-Influencing people-Team building-conflict management-Individual-Group behaviour-Motivation-supervisory effectiveness.

**3 . MARKETING MANAGEMENT 11**

The role of marketing-the environment-customer and buying behaviour-New product-product cycle-Branding and packaging -pricing-Distribution - promotion-Advertising-Sales promotion and publicity-selling and sales management-marketing organisation and control.

**4 . HUMAN RESOURCES DEVELOPMENT AND MANAGEMENT 11**

Planning personal function-employee selection, Development and growth-motivation-Job design-appraisal-compensation planning-managing industrial relations-personal-information

**5 . RECENT ADVANCES 4**

Organisation development-Management development-Business process reengineering-international marketing.

**Total No of periods: 45**

*References :*

1. *K.K AHUJA, Personal Management-Kalyani Publications-1992.*
2. *K.Aswhappa-Human Resources and personnel management-Tata McGraw Hill, 1997.*
3. *Philip Kotler, Marketing Management, Prentice Hall of India, 1992.*
4. *FredLutherns-organisational behaviour, McGraw Hill, 1995.*
5. *HaroldKoontz and Heinz Weihrich, Management, McGraw Hill, 1994.*

**PR041 Production of Automotive Components**

**3 0 0 100**

**1 . INTRODUCTION TO AUTOMOTIVE COMPONENTS 8**

Automotive Engines-basic principles Cylinder blocks-materials-production methods Dry and wet liners  
Cylinders heads-types-materials-Production methods-Production of oil pan-Engine Mountings.

**2 . ENGINE PARTS 8**

Piston-types-functions-materials-manufacturing methods-Piston rings-types-function-production-testing  
methods-Piston pin-types-materials-manufacturing methods-Production of connecting rod and crankshaft  
Balancing of crankshaft.

**3 . VALVES AND ACCESSORIES 10**

Valves-types-Mechanisms-Materials-Production methods, Production of push rod, rocker arm and tappets-cam  
shafts-manufacturing methods-Production of carburettors-King pins and propeller shafts.

**4 . FUEL AND TRANSMISSION SYSTEM 10**

Fuel system for petrol and diesel engines-principles of carburettors-fuel pumps-fuel injection pumps-multipoint  
fuel injection systems-transmission system-gear box-types-clutch system-differential mechanisms-steering  
system.

**5 . BRAKES, SUSPENSION AND ENGINE MANAGEMENT SYSTEMS 9**

Braking system-types-construction details-suspension method-leaf spring and shock absorbers-construction  
details of wheel mounting-application of sensors and actuators-Use of Robots in Assembly line.

**Total No of periods: 45**

*References :*

- 1. Heldt.P.M.High Speed Combustion Engines, Oxford and IBM Publishers Co., 1985.*
- 2. Kirpal Singh, Automobile Engineering, Vol I & II standard publishers Distributors, New Delhi, 1997.*
- 3. Newton and steels, the motor vechicle, ELBS, 1980.*
- 4. NARANF G.B.S., Automobile Engineering , Khanna Publishers, 1990.*

**1 . MECHANISMS OF WEAR AND METAL CLEANING 10**

Basic Mechanisms of wear-abrasive, adhesive wear, contact fatigue-Fretting corrosion-Testing of wear resistance-practical diagnosis of wear-general cleaning process for ferrous and non ferrous metals and alloys-selection of cleaning processes-alkaline cleaning-emulsion cleaning-ultrasonic cleaning-pickling salt bath descaling-abrasive bath cleaning-polishing and buffing shot peening.

**2 . THERMAL SPRAYING PROCESSES AND ELECTRODEPOSITED COATINGS 10**

Thermal spraying materials-characteristics of thermal spray processes-Design for thermally sprayed coatings-coating production-spray fused coatings-principles of electroplating-Technology and control-electroplating systems-properties and applications of electrodeposits-non aqueous and electroless deposition.

**3 . HOT DIP COATING AND DIFFUSION COATING 10**

Principles-surface preparation-batch coating and continuous coating process-coating properties and applications.Principles of cementation-cladding-vacuum deposition-sprayed , metal coating-structure of diffusion-coatings-chemical vapour deposition-physical vapour deposition.

**4 . NON-METALLIC COATING OXIDE AND CONVERSION COATINGS 9**

Plating coating-lacquers-rubbers and elastomers-vitreous enamels-anodizing Chromating-application to aluminium, magnesium, tin, zinc, cadmium copper and silver-phosphating primers.

**5 . QUALITY ASSURANCE, TESTING AND SELECTION OF COATINGS**

The quality plan-design-testing and inspection-thickness and porosity measurement-selection of coatings-industrial applications of engineering coatings.

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*Text Book :*

*STAN GRAINGER Engineering coatings-design and application Jaico publishing House, 1994.*

*References :*

- 1. N.V.Parathasarathy, Electroplating Handbooks, Prentice Hall, 1992.*
- 2. Metals Hand book Vol.2 8th Edition, American Society of Metals, 1994.*
- 3. D.R.Gabe, Principles of Metals surface treatment and protection, Pergamon, 1990.*
- 4. Niku-Lavi, Advances in surface treatment, Pergamon, 1990.*

**1 . BASICS 8**

Definition-types & classification of Robot-need for Robot-Installation procedure-area of applications-basics parts & function-specification.

**2 . DRIVES AND CONTROL SYSTEMS 10**

Mechanical, Electrical & fluid power-combination-selection of system-simple problems based on load for linear & rotary travel-control system-servo control-interfacing methods-micro processor, PLC and PC based.

**3 . SENSORS ANDGRIPPERS 9**

Functions of sensors-types and selection of sensors-need for grippers-types and selection of grippers-common types of grippers used-end effectors.

**4 . ROBOT PROGRAMMING 9**

Types of programming-programming languages-sample program for different types of robots-vision system-application of image processing.

**5 . MATERIAL HANDLING SYSTEMS 9**

Selection of material handling systems-conveyors, pallets, RGV/AGV, overhead crane-construction features, integration-single piece and multi piece transfer-fragile material handling systems.

**Total No of periods: 45**

*References :*

1. *Janakiraman P.A., Robotics and image processing, Tata McGraw Hill, 1995.*
2. *Yoram Koren, Robotics, McGraw Hill, 1992.*
3. *Groover M.P., Cam and Automation, Prentice Hall, 1995.*
4. *Yu Kozyhev, Industrial Robots Handbook, MIR Pub., 1985.*

**1 . INTRODUCTION 7**

Mechatronics-scope-Key issues-Evolution-Elements-Mechatronics Approach to modern Engineering and design-Review of Electronics for mechanical Engineers.

**2 . SENSORS AND TRANSDUCERS 10**

Type-Displacement, position and proximity-velocity-signal processing-DSP device -data inputing

**3 . ACTUATION SYSTEMS 8**

Mechanical-Types-Applications-Electrical-Types-Applications-Pneumatics & Hydraulic-circuits-Applications-selection of actuators.

**4 . CONTROL SYSTEMS 12**

Types of controllers-programmable logic controllers-Application-ladder-diagrams-microprocessor applications in mechatronics-programming-interfacing-computer applications.

**5 . RECENT ADVANCES 8**

Manufacturing Mechatronics-Automobile mechatronics, medical mechatronics-Office automation case studies.

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*Text Book :*

1. *BULTON.N., "Mechatronics" Electronic Control System for Mechanical and Electrical Engineering, Longman,1995.*

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1. *DRADLY, D.A., DAWSON.D., BURD, N.C and LOADER, A.J. Mehatronics-Electronics in Products & Processes-Chapmen & Hall, 1993.*
2. *HMT, " Mechatronics ", Tata McGraw Hill, 1998.*
3. *GALIP ULSOY, A and DEVRIES, W.R. "Micro computer applications in manufacturing ", JOHN WILEY, 1989.*
4. *JAMES HARTEER, "Electromechanics-Principles concept and Devices-Prentice Hall, 1995.*

**1 . INTRODUCTION 8**

Definition and objectives-Reliability models-Maintainability-Redundancy of modular concepts-Availability and system effectiveness-statistical method

**2 . TYPES OF MAINTENANCE 9**

Maintenance policies-Preventive maintenance-Non zero maintenance-Scheduled maintenance-simulation models for multicomponent equipment-condition based maintenance-methods and economics-TPM

**3 . WORK CONTROL 10**

Work order planning-priority rules-maintenance work measurement-universal maintenance standards CUMS-Monitoring performance-Indicators for evaluation of maintenance performance-Man power planning.

**4 . LOGISTIC SUPPORTS 8**

Manintenance equipments and tools-Failure analysis spareparts consumption-simualtion methods-optimum part availability-Apprasing of cost elements-UNA cost methods.

**5 . CONDITION MONITORING 10**

Vibration monitoring-signature analysis-online diagonstic systems-infraed(IR)-Scanning corrosion monitoring-Linear polarisation(LPR)-thin layer activation(TLA) wear debris monitor models(WDM).

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*Text Book :*

*1. Maintenance Engineering Hand Book-McGraw Hill Higgins & Marrow, 1995.*

*References :*

*1. Miller & Blood-Modern maintenance management-Tarapoorvala & Sons Pvt Ltd, 1976.*

*2. A.S. Garder-Maintenance Management Techniques-McGraw Hill, 1976.*

*3. Lewis & Toni-Readings in Maintenance Management-Cohers book, 1980.*

*4. Week, Hand book of machine Tools vol.3 John willey & sons, 1990.*

**1 . ADVANCES IN CASTING 9**

Newer casting techniques-Expandable pattern casting-plaster mold and ceramic mold casting -vacuum casting-squeeze casting and semisolid metal forming-Rapid solidification for Amorphous alloys-casting techniques for single crystal components.

**2 . ADVANCED FORMING AND P/M PROCESSES 9**

High Speed Forging machines-Die materials-Peen forming of sheet metals. Design consideration for P/M forming-Production of metal powders-compaction-sintering-selective laser Sintering-Finishing of sintered parts-Economic of P/M forming.

**3 . MAKING OF PLASTIC AND MICRO ELECTRONIC DEVICES 9**

Injection, Blow and rotational moulding of plastics-Thermoforming-Processing of reinforced plastics and composite materials-manufacturing Honey comb structures-shaping of ceramics.

**4 . PRECISION MACHINING 9**

Precision and Micro machining-Diamond turning of parts to nanometer accuracy-Stereo microlithography-machining of microzied components.

**5 . SURFACE TREATMENT AND FABRICATION 9**

Thermal spraying-Vapour deposition-ion inplantation-Diffusion coating-electroforming-anodizing-conversion coating-Hot Dipping-Ceramic coating-Diamond coating-Explosive welding and Diffusion Bonding.

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*Text Book :*

1. *SEROPE KALPAKJIAN, Manufacturing Engineering and Technology, Third Edition-Addison-Wesley Pub.Co(1995)*

*References :*

1. *Brahem.T.Smith, Advanced machining I.F.S., U.K.1989.*
2. *Amstead B.H., Ostwald Phylips and Bageman.R.L., Manufacturing Processes John Wileys Sons(1987).*
- 3 *Muccic, E.A., Plastic Processing Technology, Materials park, OHIO, ASM Int.,(1994).*
4. *Jaeger R.C., Introduction to microelectronic Fabrication, Addision-Wesley(1988).*

**1 . FUNDAMENTALS OF NANOTECHNOLOGY 8**

Processing system of nanometre accuracies-mechanism of material processing-Nano Physical processing of atomic bit-units-Nano-chemical and electrochemical atomic-bit processing

**2 . NANO-MEASURING SYSTEMS OF SUB-NANOMETRE ACCURACY AND RESOLUTION 10**

In process or in situ measurement of position of processing point-Post process and on machine measurement of dimensional features and surface-mechanical measuring systems -optical measuring systems-Electron beam measuring systems-pattern recognition and inspection systems.

**3 . NANO-POSITIONING SYSTEM OF NANOMETRE ACCURACY AND REPEATABILITY 10**

Guide systems for moving elements-servo control systems for tool positioning-computer aided digital ultra precision position control-Future development of micro actuators.

**4 . APPLICATIONS OF NANOTECHNOLOGY 10**

Nano-grating system-Nano-lithography-Photolithography-electron beam lithography-machining of soft metal mirrors with diamond turning-mirror grinding of ceramics-ultra-precision block gauges, balls for rolling bearings-fabrication CCD's, VCR head assemblies, Optical fibres.

**5 . FUTURE TRENDS IN NANOTECHNOLOGY 7**

Development of intelligent products-Nanoprocessing of materials for super high density IC's-nanomechanical parts-Micromachines.

**Total No of periods: 45**

*Text Book :*

*1. NORIO TANIGUCHI, Nanotechnology, Oxford University Press, 1996.*

**1 . INTRODUCTION 10**

Components of Knowledge based systems-Knowledge Representation-Types Comparison of Knowledge Representation Schemes-Inference Engine-Knowledge acquisition-Optimization and Knowledge based systems-Machine learning.

**2 . INTELLIGENT MANUFACTURING 8**

Intelligent Manufacturing-System Components-System architechure and Data flow-System operation-Flexible Assembly Systems-Tool management.

**3 . TECHNOLOGY BASED SYSTEMS 7**

Design of mechanical parts-Refinement Approach-Model based approach-Design of mechanisms-Feature based design-Knowledge based design for Automated Assembly -Process planning-Feature recongnition-Machining optimization-Knowledge Based Systems.

**4 . GROUP TECHNOLOGY 10**

Group Technology-Models and Algorithms-Cluster Analysis Method-Knowledge based systems for GT-Models and Algorithms for Machine layout-Knowledge based Systems for machine layout-Scheduling-Models and Algorithms-Knowledge Based Systems.

**5 . RECENT ADVANCES 10**

Application of Aritical Neural Networks-Fuzzy logic and genetic algorithms in manufacturing-ANN for tool wear monitoring-Fuzzy control of machine tools.

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*Text Book :*

*1. Andrew Kusiak, Intelligent Manufacturing Systems, Prentice Hall, 1990.*

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- 1. Mohammed Jamshidi, Design and Implementation of Intelligent Manufacturing Systems, Prentice Hall, 1995.*
- 2. Mitsuogen, Runweicheng, Genetic Algorithms in Engineering Design, John Wiley, 1997.*
- 3. Ibrahim Zeid, CAD/CAM Theory and Practice, McGraw-Hill, 1991.*
- 4. Elaine Rich, Artificial Intelligence, Tata McGraw Hill, 1995.*

**PR050 Purchasing and Materials Management 3 0 0 100**

**1 . FUNCTIONS OF MATERIALS MANAGEMENT 9**

Introduction to Materials Management - Objectives - Organisations - Functions - Material Circle - Administration - Integrated approach - Relationship with other department.

**2 . PURCHASING MANAGEMENT 9**

Purchasing policies and procedures-Legal aspects-Selection of sources of supply-Make or buy decision-Vendor development-Vender evaluation and rating-Methods of purchasing-Value analysis-Imports-Capital purchasing-Ethics.

**3 . STORES MANAGEMENT 9**

Store function-Location-Layout safety-Tools stores-Inventory-Stock taking-Materials handling-Transportation-Insurance-Standardisation-Variety reduction-Materials accounting-Information systems.

**4 . MATERIALS PLANNING AND INVENTROY MANAGEMENT 9**

Forecasting-ABC analysis-Materials requirements planning-Aggressive planning-Spare parts-Management-Inventory systems-Quantity.Perodic-Deterministic and probablistic models-Static inventory model.

**5 . RECENT ADVANCES 9**

Just in time purchase-Japanese management-Modern trends in material management-Value management-purchasing research-International purchasing-Logistic management.

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*Text Book :*

*1. Lamer Lee and Donald W Dobler, Purchasing and Materials Management, Textand cases, Tata McGraw-Hill, 1996.*

*References :*

- 1. Gopalakrishnan P. Handbook of Materials Management, Prentice Hall of India, 1996.*
- 2. Joseph. M. Operatopm management, McGraw Hill, 1990.*
- 3. Guptha, P.K and Manmohan, Problem in Operation Research, Sultan Chand & Sons, 1994.*
- 4. Kumar and Ghose, Materials Management, 1991.*

**PR051 Management Information Systems**

**3 0 0 100**

**1 . FUNDAMENTALS OF INFORMATION 9**

Introduction-IS for operation, management & Strategic advantage-Meaning & role of MIS-system approach-Knowledge on computer system-selection-developing IS.

**2 . INFORMATION SYSTEM TECHNOLOGY 9**

Computer hardware-Software-Telecommunications-Database management-Modern communication-Video conferencing, Internet, Super highway-system configuration &selection.

**3 . INFORMATION SYSTEM IN MANAGEMENT 9**

Transaction processing & Reporting-Decision making & decision support system-AI & Expert system-office information system-MIS as technique for programmed decision.

**4 . PLANNING, DESIGNING & IMPLEMENTING THE MIS 9**

Strategic & project planning conceptual design-detailed design-implementation, Evaluation & Manintenance-Controlling of IS.

**5 . MODERN TRENDS IN MIS 9**

System concept-control-Modelling-case study in Hostel, Hospital, Hotel, Stores, Production Industries, etc.,

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*References :*

- 1. Robert G.Murdict, Information system for Modern Management, Prentice Hall of India, 1998.*
- 2. James A. O.Brien, Management Information Systems, Galgotia Publications, 1995.*
- 3. Davis G.B, Management and Information Systems; Conceptual foundations Structure and development, McGraw-Hill, New York, 1984.*

**PR052 Business Process Re-Engineering and Management System Design 3 0 0 100**

**1 . INTRODUCTION 9**

Organisational transformation and reengineering-Fundamentals of process Re-engineering - preparing workforce for transformation and reengineering - methodology - guidelines - Transformation models.

**2 . RE-ENGINEERING PROCESS IMPROVEMENT MODELS 9**

Leadership expectation setting models - production and service improvement model - strategy for process improvement - personnel improvement model - Implementation of Business process Reengineering.

**3 . MANUFATURING SYSTEM DESIGN MODELING 9**

Computerised Manufacturing systems - Performance measures - WIP - Deadlock - Resources planning, MRP, MRP II - CAPP - Automated manufacturing systems - CNC, FMS, Materials handling systems - Robotics - AGVs.

**4 . MARKOV MODELS AND PETRINETS 9**

Stochastic processes in manufacturing - discrete and continuous models - computational issues - petri nets - classical, stochastic, extended time petrinets - applications.

**5 . RECENT ADVANCES 9**

Concurrent engineering - BPR for information Technology applications - Managing change - case studies.

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*References:*

1. Jayaraman, M.S. and Ganesh Natarajan, " *Business process Reengineering* ", TMH, 1994.
2. Dr. Johnson. A. Edosomwan, " *Organisational transformation and process reengineering* ", *British Library cataloging in publication data*, 1996.
3. Viswanathan Narahari, " *Performance modeling of automated manufacturing systems* ", PHI, 1996.
4. Ronald G. Askin and Charles R. Standridge, " *Modeling and Analysis of manufacturing systems* ", John Wiley & Sons, 1993.

**1 . INTRODUCTION 10**

Safety concepts - Functions and role of safety - Fundamentals of loss control - Safety costs - Direct and indirect costs of accidents - Life cycle costs - Influence of environment on safety (noise, lighting, temperature, humidity).

**2 . SAFETY MANAGEMENT 10**

Safety committee - system safety engineering - Policy - Operator error - qualitative error predictions - accountability - Faulttree analysis - Operating hazards analysis - risk assessment - Safety analysis Programme - Safety sampling.

**3 . PRODUCT SAFETY 10**

Design for safety - Design engineering tasks - Hazardous - Characteristics of products - Fault hazard analysis - Diagrams of service failures - Post design check lists of hazards.

**4 . ACCIDENT PREVENTION 10**

Accident and claim losses - high potential accidents - Accident prevention - Modern concepts of accident prevention - Accident investigation records minimising effects of accidents -Motivating safety programme - training - Role of supervisor - Management safety programme.

**5 . SAFETY REGULATIONS AND STATUTES 5**

Law of safety progress - Regulatory agencies and statute laws Statute law vs Common law - occupational safety and health agency.

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*Text book:*

1. *William Hammer, " Product Safety management and Engineering ", prentice Hall Int. Society, 1980.*

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1. *Danier C. Peterson, " Techniques of Safety Management ", McGraw Hill Kogakisha Ltd., Japan, 1971.*
2. *Check list for work place inspection for improving safety, " health and working condition ", Intl. Labour Organisation Geneva, 1987.*
3. *Safety and failure of components, " Proceedings of Mechanical Engineering ", London, Vol. 184, Part 38, 1974.*

**1 . INTRODUCTION 9**

Inter disciplinary nature of ergonomics-modern ergonomics-Human performance-Information processing-Factors affecting human performance-physical workload and energy expenditure.

**2 . WORK SPACE DESIGN 9**

Anthropometry-workspace design for standing and seated workers-Arrangements of components within a physical space-Interpersonal aspect of work place design.

**3 . DESIGN OF EQUIPMENT 9**

Ergonomic factors to be considered, design of display and controls-design for maintainability-heat stresses-manual lifting.

**4 . DESIGN FOR ENVIRONMENT 9**

Illumination-Climate-Noise-Vibration-Heat , cold-Lighting design considerations-Effect of noise on task performance.

**5 . RECENT ADVANCES AND TRENDS 9**

Legislative trends-Trends in work system Design-Occupational diseases-Application of Ergonomics in automobiles.

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*Text Book:*

*1. Martin Helander, A Guide to Ergonomics of Manufacturing, TMH, 1996.*

*References :*

- 1. Bridger, R.S " Introduction to Ergonomics ", McGraw Hill, 1995.*
- 2. McCormic, J., " Human factors in Engineering and Design ", McGraw Hill, 1992.*
- 3. Wilson, J.R. Corlect EN, " Evaluation of Human work ", A Practical Ergonomics methodology, Taylor and Frances, 1990.*
- 4. Shackel, B., Richardson.S., " Human Factors for Information usability ", Cambridge University Press, 1991.*