SAVITRIBAI PHULE PUNE UNIVERSITY

FACULTY OF ENGINEERING SYLLABUS FOR

PRINTING ENGINEERING

AND

COMMUNICATION TECHNOLOGY

(2017 course)

WITH EFFECT FROM YEAR 2017-2018

Structure for M.E. 2017 Course

SEMESTER I

CODE	SUBJECT	TEACHING SCHEME	EXAMINATION SCHEME					CREDITS
		Lect./ Pr	Paper		TW	Oral/ presentation	Total	
			In Semester Assessment	End Semester Assessment				
508101	Probability, Statistics and Regression Analysis	4	50	50	-	-	100	4
508102	Printing Technology Management	4	50	50	-	-	100	4
508103	Modern Trends in Printing	4	50	50	-	-	100	4
508104	Research Methodology	4	50	50	-	-	100	4
508105	Elective I	5	50	50	-	-	100	5
508106	Lab Practice I	4			50	50	100	4
	Total	25	250	250	50	50	600	25

SEMESTER II

CODE	SUBJECT	TEACHING SCHEME	EXAMINATION SCHEME					CREDITS
		Lect./ Pr	Paper		TW	Oral/ presentation	Total	
			In Semester Assessment	End Semester Assessment				
508107	Colour Science	4	50	50	-	-	100	4
508108	Web Handling on Press	4	50	50	-	-	100	4
508109	Substrate and Ink	4	50	50	-	-	100	4
508110	Elective II	5	50	50	-	-	100	5
508111	Lab Practice II	4	-	-	50	50	100	4
508112	Seminar I	4	-	-	50	50	100	4
	Total	25	200	200	100	100	600	25

SEMESTER III

CODE	SUBJECT	TEACHING SCHEME	EXAMINATION SCHEME					CREDITS
		Lect./ Pr	Paper		TW	Oral/ presentation	Total	
			In Semester Assessment	End Semester Assessment				
608101	Printed Electronics and RFID	4	50	50	-	-	100	4
608102	Advances in Converting and Packaging	4	50	50	-	-	100	4
608103	Elective III	5	50	50	-	-	100	5
608104	Seminar II	4	-	-	50	50	100	4
608105	Project Stage I	08	-	-	50	50	100	8
Total		25	150	150	100	100	500	25

SEMESTER IV

CODE	SUBJECT	TEACHING SCHEME	EXAMINATION SCHEME				CREDITS
		Lect./ Pr	Paper	TW	Oral/ presentation	Total	
608106	Seminar III	5	-	50	50	100	5
608107	Project Work Stage II	20	-	150	50	200	20
Total		25	-	200	100	300	25

List of Elective Subjects

Note: Select any one subject from module I and one subject from module II for each Elective.

Elective-I (5 credits)		Elective-II (5 credits)		Elective-III (5 credits)	
Module I (credits=4)	Module II (credit=1)	Module I (credits=4)	Module II (credit=1)	Module I (credits=4)	Module II (credit=1)
1) Workflow Management in Printing	i) Fundamentals of Cyber Security	1) Digital Printing	i) AI tools	1) Multimedia Systems and Communication	i) Human Rights
2) Printing and Packaging Materials	ii) IPR and Patent Law	2) Polymer Science	ii) Disaster management	2) Ink Technology	ii) Technical Communication
3) PressFinger Printing	iii) Project Management	3) Quality Control Systems and Productivity	iii) Green building design		

EXAMINATION SCHEME

A) Compulsory subjects: Credits 4

Total marks: 100

To be done at Institute Level		University Exam	
In semester assessment Units 1 - 4		End semester assessment	
Class tests	30 Marks	Units 1- 4	18 Marks
Assignments / Mini Project	20 Marks	Unit 5	16 Marks
		Unit 6	16 Marks
Total	50 Marks	Total	50 Marks

B) Elective subjects: Credits 5

Total marks: 100

Module 1 (Credits – 4)			
In semester assessment Units 1-4		End semester assessment	
Class tests	15 Marks	Units 1 & 2	12 Marks
Assignments	10 Marks	Units 3 & 4	14 Marks
		Unit 5	12 Marks
		Unit 6	12 Marks
Total	25 Marks	Total	50 Marks

Module 2 (Credit – 1)	
In semester assessment	Units 1-2
Class tests / Assignments	25 Marks

508101: Probability, Statistics and Regression Analysis

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

1. Probability & Random Variable
   Probability concepts, Random Variables, Binomial. Poisson, Geometry, Negative Binomial, Exponential, Gamma, Distributions, Functions of Random Variables. [8 hours]

2. Basic Statistics
   Descriptive statistics like mean, median, standard deviation, percentiles; correlation and regression - interpretation and prediction problems; the normal and binomial distributions; law of averages; sampling variability and standard errors; inferential statistics to - confidence intervals and tests of hypotheses for one- and two-sample problems, Multivariate probability distributions, sampling distributions. [8 hours]

3. Regression Analysis
   Simple and Multiple linear regression; resolution of fit of a model, including residual analysis, precision of estimation, and tests of general hypotheses; model building; step-wise regression; use of indicator variables, Generalized Linear model [8 hours]

4. Multiple Regression
   Least square(LS) estimation, Error and estimation, Variance- Covariance of LS estimators. Estimation of error variance, Test of Hypotheses for one and more than one linear parametric functions. Confidence interval, ANOVA. Non Linear regression, Binary Logistic Regression, Ordinal and Nominal Regression [8 hours]

5. Statistical Quality Control
   Quality, Basis of Control Charts, Types of Control Charts, X & R, U, C, P, NP, I/MR, Zone charts, Control Charts for Variable and Attribute criteria, Acceptance sampling, Use of OC curve. [8 hours]

6. Design of Experiments for Quality Improvement
   Statistical methods useful for improving the quality of products and systems in an industrial setting. Planning an experiment, experimental strategy, Analysis of Variance concepts, factorial designs, orthogonal arrays, loss functions, signalto-noise ratios, identifying significant factor effects, graphical methods, parameter design and tolerance design.. [8 hours]

References:

1. Draper, N. R. and Smith, H(1998). Applied Regression Analysis, 3rd Ed. (John Wiley).

2. McCullagh, P and Nelder, J. A. (1989). Generalized Linear Models. (Chapman & Hall).

3. Ratkowsky, D.A. (1983). Nonlinear Regression Modelling (Marcel Dekker).

4. Hosmer, D.W. and Lemeshow, S. (1989). Applied Logistic Regression (John Wiley).

5. Seber, G.E.F. and Wild, C.J. (1989). Nonlinear Regression (Wiley)

6. Neter, J., Wasserman, W. and Kutner,M.H. (1985). Applied Linear Statistical Models.

7. Montgomery, Douglas C.; Peck, Elizabeth A.; Vining, G. Geoffrey (2003). Introduction to Linear Regression Analysis. (Wiley), Wiley Publications

8. Probability Statistics and Queueing Theory by P. Kandasamy, K. Thilagavathi, K. Gunavanthi, S. Chand Publication, Edition I, 2004.

9. J. K. Sharma, Operation Research-Theory and Application, MacMillan India Ltd., New Delhi

10. J. Juran, Handbook of Quality Control, Tata Mc Graw Hill Publication, 5th Edition, 1951.

11. Col. D. S. Cheema, Operation Research, Laxmi Publications (P) Ltd., Bangalore.

12. Erwin Kreysig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd., New Delhi.

508102: Printing Technology Management

Teaching Scheme	Examination Scheme
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

1. Introduction to Organization and Structure of Printing Business –
   Printing Industry Domestic and Foreign Market Overview, Market Analysis and Strategic Planning,
   Analysis of Business and Production Model Building. [8 hours]

2. Introduction to Print Production and Operations Management – Types of Print Products, Product
   Design, Product Strategies, Product Policy of an Organization, Objective of Production
   Management, Classification of Production Management Systems, Techniques for Improving The
   Design Process, Process Design and Selection, Layout Design, Production Planning, Functions and
   Scope Print Production Departments, Shop Floor Management, Problem Identification and Solution
   Methodologies, Preventive Action Tools and Measurements. [8 hours]

3. Managing the Supply Chain – Introduction, Objectives, Demand Forecasting, Long-term and short-
   term Forecasts, Classification of Forecasting methods, least square methods of Forecasting, Moving
   average Forecasting, Exponential smoothening method, forecast errors. [8 hours]

4. Inventory Control – Meaning, Types of Inventories, Inventory Control, Inventory Models, Inventory
   Control system, Selective control of Inventory. [8 hours]

5. Quality Management – Quality challenges, Fundamental concepts of Quality, Quality Cost,
   Specification of Quality, Quality Assurance, Quality strategy development, Cost of quality analysis &
   implementation, ISO, Six Sigma and Other Quality Management Systems and Its Implementation in
   Printing Industry. [8 hours]

6. Statistical Print Process Control – Process, Variations, Types of Variation, implementation of SPC,
   Control Charts and its types, Use of Control charts for print application, Control charts for variables,
   Control charts for attributes, Process Capability and Indices, Process Performance and Indices,
   Acceptance Sampling, Types of Sampling Plans, OC Curves. [8 hours]

References:

1. Martand T. Telsang, Production Management, S. Chand Publication, New Delhi, 2005.

2. O. P. Khanna, Industrial Engineering & Management, 1992.

3. L. C. Jhambh, Quantitative Techniques, Everest Publication.

4. J. Juran, Handbook of Quality Control, Tata Mc Graw Hill Publication, 5th Edition, 1951.

5. Douglas H. W. Allan, Statistical Quality Control: An Introduction for Management, Reinhold Pub.Corp, 1959.

6. Phillip. E. Hicks, Industrial Engineering & Management, Mc Graw Hill International Edition.

7. David Bainbridge, Intellectual Property, Pearson Education.

8. Dominick Salvatore, Managerial Economics in a Global Economy, Thomson South – Western Edition.

9. Stevenson, W. J. (2007). Operations Management (9th ed.). New York: McGraw-Hill Irwin.

508103: Modern Trends in Printing

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

1. Offset - Substrate selection for web offset printing, offset printability, and printing defects. Offset press components, printing units, principles of drying, impression rollers and blankets. Ink variables, and differences between inks for publication, packaging and product printing. Automatic Plate Mounting systems for offset process, Digital Printing.   [8 hours]

2. Flexography- Configurations of a Flexo Press, Application of Flexo in Packaging & Label printing, Conventional & Digital Flexo plate-making, Distortion Factors, Flexo printability, Closed and Open Inking System, Function and Benefits of Closed Inking Systems, Anilox Roller- Construction, Benefits, Cell structures, Cell Volume, Selection of Anilox in Relation to Printing. [8 hours]

3. Rotogravure- Substrate selection for rotogravure, gravure printability, and printing defects. Cylinder plating, Plating Variables & Calculation, Hardness, Engraving, proofing, Gravure press components, printing units, Doctor blades- purpose & types, Ink variables, and differences between inks for publication, packaging and product printing.   [8 hours]

4. Impression Roller- Function, Elastomers, Properties of Covering materials, Nip width, Electrostatic Assist, Rubber Hardness & its effect on Print Quality. [8 hours]

5. Drive Systems - Common Shaft & Electronic Line Shaft, Working Principle, Limitations of Common Shaft, Benefits of ELS, Pneumatics and Hydraulics used in different Printing Processes. [8 hours]

6. Press Environment Logistics- Handling Systems, Waste disposal, exhaust air purification, cleaning systems pressure, climate requirements, machine maintenance and care.   [8 hours]

References:

1. Haward M. Fenton, Frank J. Romano, On Demand Printing, GATF, 1998.

2. Bob Durrant, Development in Web Offset, Pira International, 1993

3. Molly J. Joss, Comparative Guide to Direct-to-Press Technology, 2nd edition, 1999.

4. H. Kipphan, Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg, 2001.

5. Gravure Process and Technology, Gravure Education Foundation and Gravure Association of America, 2003.

6. Harry B. Smith, Modern Gravure Technology, Pira International, 1994.

7. Steve Doyle, Advancements in Printing Plate Technology, Pira International.

8. Tony White, High Quality Flexography, Pira International, 1998.

9. Flexography-Principles and Practices, Volume 1-6, FFTA, 5th Edition, 1999

508104: Research Methodology

Teaching Scheme	Examination Scheme
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

Unit 1:

Definition, Research Characteristics, Research Need, Objectives and types of research: Motivation and objectives – Research methods vs Methodology, Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.

[8 Hrs]

Unit 2:

Research Formulation – Defining and formulating the research problem -Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis.Summarizing a Technical Paper - summary template
Online tools - Google, CiteSeer, ACM Digital Library, The on-line Computer Science bibliography, Searching patents [8 Hrs]

Unit 3:

Research design, sampling design and scaling techniques – Research design – Basic Principles- Need of research design — Features of good design – Important concepts relating to research design, basic principles of experimental designs, implications of sample design, steps in sample design, criteria of selecting sampling procedure, characteristics of good sampling design, different types of sample design. Scaling techniques: measurement scales, sources of error, technique of developing measurement tool, important scaling techniques, scale construction techniques.

[8 Hrs]

Unit 4 :

Data Collection and analysis:- Observation and Collection of primary and secondary data - Methods of data collection, processing operations, types of analysis, statistics in research, measures of central tendency, measures of dispersion, measures of asymmetry, measures of relationships, simple regression analysis, multiple correlation and regression, partial correlation.

[8 Hrs]

Unit 5:

Reporting and thesis writing – Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation –Practice – Making presentation – Use of visual aids - Importance of effective communication - Documentation and presentation tools: LATEX

[8 Hrs]

Unit 6:
Types of technical papers - Journal papers, Conference papers, Survey papers, Poster papers, Review papers Comparison, Structure of a survey, conference and journal paper, Organization and flow of thesis/ Project report, Research proposal: preparation, budgeting, presentation, funding agencies for engineering research, Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights.
[8 Hrs]

Text Books :
1. Kothari, C.R., Research Methodology: Methods and Techniques. New Age International
2. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., An introduction to Research Methodology, RBSA Publishers
3. Suresh Sinha, Anil K Dhiman,Research Methodology, ESS Publications,Volumes 2
4. Day R.A., How to Write and Publish a Scientific Paper, Cambridge University Press
5. Wadehra, B.L. Law relating to patents, Trade Marks, copyright designs and geographical indications. Universal Law Publishing

References:
1. Louis Cohen, Lawrence Manion and Keith Morrison, Research Methods in Education, 7th Edition, Cambridge University Press, ISBN – 978-0415-58336-7
2. Anthony, M., Graziano, A.M. and Raulin, M.L., Research Methods: A Process of Inquiry, Allyn and Bacon
3. Ranjit Kumar, Research Methodology: A Step by Step Guide for Beginners, 2nd Edition, APH Publishing Corporation
4. Leedy, P.D. and Ormrod, J.E., Practical Research: Planning and Design, Prentice Hall
5. Fink, A., Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
6. Leslie Lamport, ' Latex: A document preparation system' Addison Wesley, Reading, Massachusetts, second edition, 1994, ISBN 0-201-52983-1.

508105: (ELECTIVE- I)

CODE	TEACHING SCHEME	EXAMINATION SCHEME						CREDITS
		Paper		TW	Oral / Presentation	Total		
508105	Lect/week	In semester Assessment	End Semester Assessment					
	5	50	50	-	-	100		5

Code No.	Modules of 4 credit (Select any one)	Code No.	Modules of 1 credit (Select any one)
508105 M1(i)	Workflow Management in Printing	508105 M2(i)	Fundamentals of Cyber Security
508105 M1(ii)	Printing and Packaging Materials	508105 M2(ii)	IPR and Patent Law
508105 M1(iii)	PressFinger Printing	508105 M2(iii)	Project Management

Elective I
508105M1 (i): Workflow Management in Printing

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment: 25 marks
Credits: 4	End Semester Assessment: 50 marks

1. Introduction – Conventional Workflow, Digital Workflow & its significance, Comparison between Conventional and Digital workflow. [8 hours]

2. Types of Workflow – Workflow for Pre-Press to Press, Workflow types and their architecture,Production Module, Conversion to PS or PDF, Job Ticket, Pre-flight checking, Trapping, Proofing, Corrections, Imposition, Image replacement, Ripping, Imaging, Archiving, Conversion. [8 hours]

3. Process & Business Module – Process Management Task, Job Entry, Creating Folders on Servers, Job/ Process Engineering, Schedule Process, Retrieve elements, Process error trapping & notification, correction handling, intervention Notification/Handling, Customer communication handling, CIP3 , Transfer upstream of color requirements, Transfer upstream of printer requirements, color management support, Archieve job, Business Management Task, Open job order, Estimating, Job tracking, Proofing approval, Job costing, Shipping, Close order, Billing. [8 hours]

4. Infrastructural Requirements – Networking, Cabling, Machine configuration requirements, Languages & software's used in workflow, Platforms, OPI, APR –Servers [8 hours]

5. Integrated Systems – Key elements of integration system such as Electronic Desktop Publishing, Electronic Imposition, Pagination, File Formats such as JDF, PDF, PJTF, CIP 4, PPF, Digital Proof, Inspection & Corrections, and Functions of elements in integrated system. [8 hours]

6. Finance Management – Scope, Cost Benefit analysis, Return on Investment, Study & comparison of various Digital workflows, latest developments in workflow management systems. [8 hours]

References:

1. William Stallings, Data and Computer Communications, Pearson Prentice Hall, 5th edition.

2. Andrew S. Tannenbaum, Computer Network, Prentice Hall PTR, 2002.

3. Jessica Keyes, Multimedia Handbook, Mc Graw Hill Publication, 1994.

4. H. Kipphan, Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg, 2001.

5. Richard M. Adams II & Frank J. Romano, Computer-to-Plate-Automating the Printing Industry, GATF Press, 2nd edition.

508105M1(ii): Printing & Packaging Materials

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment : 25 marks

End Semester Assessment: 50 marks

1. Materials for Printing – Study of materials for pre-press films used for image-setter, plates used for plate-setter, chemicals used for processing of plates, light sources used such as laser, UV etc, plating chemicals for Gravure cylinders such as copper chrome nickel etc. plating tanks plating calculations such as current, density, time etc, Different Types of CTP Plates like Thermal, Violet etc. [8 hours]

2. Substrates used for printing and packaging- Paper such as Machine Glazed, Super Calendered, News Glazed, Map litho, Newsprint, Roto-newspaper, Paper properties and its interaction with ink, Plastics such as Polyolefin like Polyethylene, BOPP, properties and application, Manufacturing process for polyolefin, PET, Aluminium foil, Metalized films, Factors to be considered for selecting substrate for package   [8 hours]

3. Identification of the materials for printing and packaging – Identifying the materials by tearing, burning and solubility.   [8 hours]

4. Testing of materials for printing and packaging – Test on package such as Bursting strength, Puncture resistance, Grammage, Drop test, Mechanical strength, Tensile strength, Modulus of elasticity, Flexural test, Optical test, Chemical test, COF, Bond Strength, Rub resistance, Scratch proof test, Adhesion tape test.   [8 hours]

5. Inks used for Print Packaging – Solvent based, PU, Vinyl, PA, NC, Water based, UV inks, Paste Inks, Ink Composition, Ink Ingredients, drying mechanism, Surface Energy. [8 hours]

6. Testing on inks – Dispersion, Color comparison by Draw down and Printing, Strength comparison, Tack measurement, Viscosity measurement, Adhesion tests, Troubleshooting for inks and substrates.
                                                                                                   [8 hours]

References:

1. A. S. Athayle, Plastics in Packaging, Tata McGrawHill Publication, 1992.

2. A. S. Athayle, Plastics in Flexible Packaging, Multi-Tech Publishing, 1992.

3. Ronald E. Todd, Printing Inks: Formulation Principles, Manufacture and Quality Control, Pira International, 1994.

4. E. A. Apps, Printing Ink Technology, Leonard Hill Ltd., 1958.

5. James P. Cassey, Pulp and Paper-Chemistry & Chemical Technology, Inter Science Publication, 1960.

508105M1(iii): Press Finger Printing

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment : 25 marks
Credits: 4	End Semester Assessment: 50 marks

1. Introduction – Standardization, Need for Standardization, Understanding Fingerprinting, Characterization & Optimization Facts, Benefits such as Time, Materials, Efficiencies, Capabilities, Requirements of a Pre-Press such as Design considerations.   [8 hours]

2. Press Optimization – Understanding Press Variables such as Speed, Pressure, Viscosity, Ink Temperature, Plates, Cylinder cell structures, stylus angle, Inks, Substrates, Press Optimization Procedures, Density, Dot gain, Contrast, Trap, Hue error, Gray balance, Color deviation. [8 hours]

3. Elements for Evaluation – Materials required for evaluation such as Densitometer & Spectrophotometer, IT-8, ECI 2002 charts, Registration marks, Slur Target, Color Control Strip, Ugra
Step Wedge, Flag marks, Balls and Beads, Tracker line, Positive and Reverse text/type, Vignette, Gray scale, Hair-line elements and images for evaluation, Test Forms for Flexo & Letterpress, Viewing conditions. [8 hours]

4. Standardization Essentials – Implementing the Process such as Define, Specifying color targets & Product requirements, ICC Profiling, Plan & Run Standardization Test for capabilities and optimization, Characterize, Maintaining Consistency. [8 hours]

5. Post Fingerprinting – Analysis of results, Profile editing, white point of substrates, workflow setup and management of color reproduction systems, Profiling, Profile Maker Packaging, Bump Curves & their Application.   [8 hours]

6. Statistical Techniques for Variables – Short-Term & Long-Term Variation, Sample & Analyze the data, Control charts for subgroups, individuals & attributes, Run chart, Process stability and Process capability [8 hours]

References:

1. Ken Holmes, Total Quality Management, PIRA International, 1992.

2. Miles Southworth, Donna Southworth, Quality & Productivity in Graphic Arts: How to Improve Quality, Graphic Art Pub. Co., 1989.

3. Gravure Process & Technology, Gravure Education Foundation and Gravure Association of America, 2003.

4. Tony White, High Quality Flexography, Pira International, 1998.

5. Dr. Abhay Sharma, Understanding Color Management, Thomson Delmar Learning, 2003.

6. J. Juran, Handbook of Quality Control, Tata Mc Graw Hill Publication, 5th Edition, 1951.

508105M2(i)FUNDAMENTALS OF CYBER SECURITY

Teaching Scheme
Lectures: 1 Hr/Week
Credit : 1

Examination Scheme
In-Semester Examination : 25 Marks

COURSE OBJECTIVES
Upon successful completion of this course the student will be able to:
1) Explain what is meant by a cybercrime
2) Describe how computers and other technologies are used to commit cybercrimes
3) Discuss the social theories of computer-enabled abuse
4) Discuss the hacker's motivation
5) Explain what worms, Trojans, viruses, and spyware are
6) Utilize protocols such as TCP/IP and UDP
7) Describe the various types of network and computer attacks
8) Explain how firewalls and intrusion detection systems work
9) Delineate how information security can be used to mitigate cyber crimes
10) Discuss law enforcement's response to cybercrime
11) Plan how to defend against attacks
12) Explain how encryption can be used and abused

Unit 1:
Introduction cyber security [Ref. 2, Chap. 1 to 4] :
Ethics and Law, What is a Cyber Crime / Social Theories, Computer Security: Then and Now,
Computer System Security / Access Controls, Intrusion Detection: An Overview, Malicious Software
Use and Detection [4 Hrs]
Security principles, threats and attack techniques: Introduction to security, Information security,
Security triad: Confidential, Integrity, Availability, Focus of control, Security threats and attacks, Security
management [2 Hrs]
Authentication and access control: Identification, Authentication, Authentication by passwords, Protecting
passwords, Access control structures, Types of access control [2 Hrs]

Unit 2:
Lattice and reference monitors: Security levels and categories, Lattice diagram, Reference
monitors, Security kernel, Hardware security features, protecting memory [2 Hrs]
Security models: Bell-LaPadula, Biba, Non-deducibility, Non-interference, Other models [2 Hrs]
Cryptography: Cryptographic mechanisms, Digital signatures, Encryption, Certificates
[2 Hrs]

Reference Books:

1. Dieter Gollmann, "Computer Security", 2nd ed., John Wiley & Sons, 2006 ISBN: 0-470-86293-9
2. Rick Lehtinen and G.T. Gangemi, "Computer Security Basics", O'Reilly Media, Inc., 2nd 2006 ISBN: 10: 0596006691

WEBSITES:
1) www.cert.org
2) www.microsoft.com/security/
3) www.sans.org
4) www.us.cert.gov

508105 M2 (ii) : IPR AND PATENT LAW

Teaching Scheme
Lectures: 1 Hr/Week
Credit: 1

Examination Scheme
In-Semester Examination : 25 Marks

Unit1:
Intellectual property, History, Types(Seven types of Intellectual Property Right**s**) viz. Patent, Industrial Designs, Trademark, Copyright, Geographical Indication, Integrated Circuit Layout, Trade Secrets.
Patents and standards: History of patent law, History of Indian Patent System, Utility model
Procedures: Patent application, Patent infringement and enforcement, Patent licensing, Patent prosecution. Criteria of patentability, Rights granted for IP owners.
Legal requirements: Patentable subject matter, Novelty, Utility (patent), Inventive step and non-obviousness, Industrial applicability, Person skilled in the art, Prior art, Inventor ship, Sufficiency of disclosure, Unity of invention**,** Intellectual property brokering, Intellectual property education, Intellectual property infringement, Intellectual property valuation**.** [7 Hrs]

Unit:2
CEN and CENELEC Patent Policy, CEN-CENELEC Guidelines for Implementation of the Common IPR Policy on Patents, Declaration of patents.
Copyright: CEN-CENELEC copyright policy, piracy. Industrial design rights
Trademarks: Geographical indication, Protected designation of origin, Trade dress.
Other types**:** Database right, Fashion law, Indigenous intellectual property, Industrial design rights (or registered designs), Intellectual rights to magic methods, Internet domain name, Know how, Mask work (or Integrated circuit layout design protection), Open-source software, Orphan drug rights, Personality rights, Plant breeders' rights Patent law by region or country: Indian patent law, Australian patent law, Canadian patent law, Patent law of the People's Republic of China, European patent law, Japanese patent law, United States patent law. [7 Hrs]

Text Books:
1) Intellectual Property Rights - Prabuddha Ganguli, Tata McGraw Hill publishing Company Ltd.
2) Satarkar S.V., Intellectual Property Rights and Copy Right. ESS Publications.

References:
www.cen.eu
www.cenelec.eu
www.cencenelec.eu
http://ipindia.nic.in/
http://ipindia.nic.in/ipr/patent/patents.htm
http://www.ipaustralia.gov.au/ (Australian Intellectual property)
http://guides.slv.vic.gov.au/
http://www.cipo.ic.gc.ca (Canadian patent office)
http://www.epo.org(Europian patent office)
http://www.academicleadership.org/emprical_research/The_State_of_Intellectual_Property_Education_Worl dwide.shtml (Intellectual property education) http://www.epo.org/law-practice/legal-texts/html/epc/2010/e/ar69.html http://www.epo.org/law-practice/legal-texts/html/epc/2010/e/ar64.html
http://www.cas.go.jp/jp/seisaku/hourei/data/PA.pdf
http://nopr.niscair.res.in/bitstream/123456789/12687/1/JIPR%2016%285%29%20377-384.pdf

508105 M2 (iii) PROJECT MANAGEMENT

Teaching Scheme

Lectures: 1 Hr/Week

Credit: 1

Examination Scheme

In-Semester Examination: 25 Marks

Unit 1

Project Scheduling: Gantt chart and its application, AOA (Activity on Arrow diagram), AON (Activity on Node) Diagram, Precedence diagramming methods (PDM), Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), GERT (Graphical Evaluation and Review Technique), Resource allocation, Line of Balancing and crashing the network.

Project Quality Management: The processes of project quality management, Quality planning, assurance and control, Quality of procured items, Techniques of quality assurance and control, project execution and control, International Project Management. [9Hrs]

Unit 2

Project Risk Management: Introduction, Managing risks in projects, Measurement and assessment of risk, Sources of risks. Risk: - Adjusted discount rate method, certainly equivalent method, correlation coefficient, portfolio risks, diversible & non-diversible risks, CAPM (Capital Asset pricing model) case studies of project management, computer aided project management.

[5Hrs**]**

Text Books:

1. K. Nagarajan, "Project Management", 5th Edition, New Age International Publishers, 2010.
2. Prasanna Chandra, "Projects: planning, analysis, selection, implementation and review", 4th Edition, Tata McGraw Hill Publishing Co. Ltd, New Delhi, 1995.
3. Rosy Burke, "Project Management: planning and control technique", Wiley India, 2003
4. S. Chaudhary, "Project Management", Tata McGraw Hill, 1988.

Reference Books:

1. J. R. Meredith, S. J. Mantel, "Project Management: A managerial approach", Wiley India, 2010
2. John M. Nicholas, Herman Steyn, "Project Management", 3rd Edition, Elsevier Inc., 2008
3. Samuel Mantel, Jr. J. R. Meredith, S. M. Scafer, M. M. Sutton, M. R. Copalan, "Project Management" 1st Edition, 2011

508106: Lab Practice I

Teaching Scheme   **Examination Scheme**

Lectures: 4 Hours / Week   TW: 50 marks

Credits: 4   Oral: 50 Marks

A minimum of eight experiments should be performed under Lab Practice – I.

<u>List of Experiments</u>

1. Layout designing using Adobe InDesign
2. Graphics generation with Illustrator
3. Image editing using Photoshop
4. Introduction to Optical properties of substrates
5. Understanding the surface properties of substrates
6. Effect of opacity and gloss on printability
7. Impact of surface smoothness and porosity on printability
8. Relationship between surface energy on printability
9. Introduction to color management software – monitor, scanner and printer calibration
10. Customize test chart generation for process colors, process + 6 spot colors, and spot colors upto 10 channels

SEMESTER II

508107: Color Science

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment: 50 marks

End Semester Assessment: 50 marks

1. Color Vision **-** Vision process, Retinal cells, Rods and cone distribution, Retnal interconnection of cone signals, Rod and cone responses, luminous efficiency functions, Purkinji phenomenon, Factors in the eye that control the internal stimulus : Image information by eye, Eye axes and eye angle, Chromatic aberration of the eye, Pupil size, light lossesin the eye, florescent light in the eye, Adaptation mechanisms, Simultaneous contrast, retinal after image [8 hours]

2. Colorimetry & CIE color system **-** What is colorimetry? System based on colorimetry, System based on color mixing, System based on color perception, Color matching, Spectral power distribution, color temperature Tranformation of color from RGB to various color coordinates, CIE LAB, CIE CAM02
   [8 hours]

3. Color difference assessment **-** Assesment by visual method, Assesment by instrumental method, Equation based on: Munsell Data, Just perceptible difference data, Standard deviation of color matching-MacAdam elipse, The current CIE recommandations, Perceptibility Vs Acceptability [8 hours]

4. Color Matching **-** Classification of matching procedure, Maxwell's method of color matching, Precision of color matching for normal trichromats, Color matching functions of normal trichromats, Factors modifying color matching, Metamerisam- The cause of metamerisam, Definition of metamerisam, degree of metamerisam , Index of metamerisam, color inconstancy [8 hours]

5. ICC profile construction **-** Profiles and PCS in the ICC architecture, Reference viewing condition and medium, ICC profile structure, ICC profile types, ICC color processing models- LUT, ICC tag types, Making profiles   [8 hours]

6. Color and the optical properties of materials **-** Color due refraction and dispersion, Production of color by reflection, Color due to scattering, Color due to molecules [8 hours]

References:

1. R. W. G Hunt, M. R. Pointer, Measuring Color, Fourth Edition, Wiley-IS&T Series
   Bilmeyer and Saltzman,Principles of Colour Technology, Second Edition, Wiley-Interscience
   publication

2. Wyszecki and Stiles, Color Science, Concepts and Methods Quantitative Data and Formulae, Second
   Edition Wiley-Interscience Publication

3. Edited by Phil Green, Color Management, Understanding and using ICC profiles, Wiley IS& T Series

4. Richard J. D. Tilley, Second Edition, Color and the optical properties of material, Wiley
   publication, John Wiley and sons

508108: Web Handling on Press

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment : 50 marks

End Semester Assessment: 50 marks

1. Web Viewing & Splicing Systems – Stroboscope, Video viewing, purpose, working and functions, Splicing mechanism for web presses such as gravure, flexo, offset etc. [8 hours]

2. Treatment Systems on Web – Preconditioning of web, corona treatment, working & purpose of corona treatment, measurements for treatments-dyne level requirements for different applications, flame treatment, antistatic eliminators.   [8 hours]

3. Web Tension Control – Tension Zones, 3 zonal concepts: unwind tension zone, intermediate tension zone & rewind tension zone and 4 zonal concepts: unwind tension zone, in-feed tension zone, printing tension zone & rewind tension zone, Tensioning devices such as Brakes & Clutches, Load Cells, Dancer Rollers and factors influencing web tension.   [8 hours]

4. Register Control – Purpose, Lateral & Circumferential Register control by web movement and cylinder movement, Use of compensator roller for circumferential registration, cylinder grading, register marks & its specification, automatic register control by scanning register marks on moving web. [8 hours]

5. Web guiding & Balancing of Rollers – Web guiding systems and its correction mechanism, Imbalance of a roller, Static & Dynamic Balancing, Measurement and calculation. [8 hours]

6. Web Transport Roller- Purpose, Covering used, roller tolerances, wrap angle, lead-in-lead out rollers, specifying the diameter of web transport roller, deflection of roller, measurement & calculation. [8 hours]

References:

1. Introduction to Web Printing by Bob Durrant, Pira Publication, 1993.

2. Gravure Process and Technology, Gravure Education Foundation and Gravure Association of America, 2003.

3. Harry B. Smith, Modern Gravure Technology, Pira International, 1994.

4. W. R. Durrant, Web Control, Northwood Publication, 1977.

5. Tony White, High Quality Flexography, Pira International, 1998.

6. Bob Durrant, Development in Web Offset, Pira International, 1993

7. Flexography-Principles and Practices, Volume 1-6, FFTA, 5th Edition, 1999.

8. Charles Klauss, New Technology and the Size Press, Pira International, 1996.

508109: Substrate and Ink

Teaching Scheme	Examination Scheme
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

1. Introduction – Brief survey of pulping technology and processes of manufacturing paper and various other substrates like flexible packing materials, importance of recycling of substrates, FSC, Green Printing, Different types of paper & plastic substrate used for printing, Polymer Technology, Polymer structure for various application, Environmental issues, Paper sizes in metric & English units, Biodegradable substrate and its characteristics.   [8 hours]

2. Selection criteria of substrate – Paper and Plastic substrates for printing, Quality of paper and plastic substrates, Problems arising in printing processes due to the various defects in paper and plastic substrates. Testing methods such as physical, mechanical, optical and chemical properties of paper and plastic substrates with reference to ASTM & TAPPI standards required for printing, packing & computer stationery.   [8 hours]

3. Ink requirements – Brief study of various printing techniques with reference to the printing ink quality requirements, raw materials used and technology of printing ink manufacturer for different types of inks, Ink formulation principles and raw material, Different drying mechanisms including UV curing EB curing, Study of formulation composition of litho, flexo, gravure & screen printing inks with reference to the essential properties required.   [8 hours]

4. Speciality Inks – Special types of printing inks such as Metallic inks; Water based inks, ink jet printing inks, electrographic inks, security and special effect printing inks, Thermographic, Scented, Fluorescent, Decorative Product Inks.   [8 hours]

5. Costing – Cost estimation & cost systems study for understanding costing of various printing & converting jobs with reference to paper and plastic substrates.   [8 hours]

6. Quality Control & Environment – Purpose, Quality control for substrate and ink, BIS and ISO, Total Quality Control, EMS – 14000, Quality control for Paste and Liquid inks. Hygiene Management System, BRC-IOP, HACCP, Food Safety, Environmental study of material waste causing pollution, Pollution prevention methods. Environmental laws for print industry, VOC & its significance in printing inks, Hazardous waste.   [8 hours]

References:

1. Christopher J. Bierman, Handbook of Pulping and Paper Making, Academic Press, California, 2nd Edition, 1993.

2. James P Casey, Pulp and Paper – Chemistry and Chemical Technology

Vol. I to IV, Third Edition, 1960.

3. Apps E. A, Printing Ink Technology, Leonard Hill (Books) Ltd. Efen Street, London, 1958.

4. Ronald E.; Printing Inks Pira International Ronald E. Todd, Leatherhead, 1996.

5. Chris H. Williams; Printing Ink Technology, Pira International, 2001.

6. Dr. Nelson R. Eldered, What Printer Should Know About Ink, GATF Press Pittsburgh, 2001.

7. Laden P. O, Chemistry & Technology of Water based Inks, Blackie Academic & Professional

- Imprint of Chapmall Hall, 1st Edition, 1997.

8. Reger V. Dickerson, War or Waste, Graphic Communication Association Alexanderia, Virginia.

9. Lawrence A. Wilson, What Printer Should Know About Paper, GATF Press Pittsburgh, 1998.

10. Bureau of Indian Standards, Manik Bhawan, New Delhi.

11. Technical Association for Pulp and Paper Industry, Atlanta, U. S.

508110: (ELECTIVE- II)

CODE	TEACHING SCHEME	EXAMINATION SCHEME						CREDITS
		Paper		TW	Oral / Presentation	Total		
	Lect/week	In semester Assessment	End Semester Assessment					
508110	5	50	50	-	-	100		5

Code No.	Modules of 4 credit (Select any one)	Code No.	Modules of 1 credit (Select any one)
508110 M1(i)	Digital Printing	508110 M2(i)	AI Tools
508110 M1(ii)	Polymer Science	508110 M2(ii)	Disaster Management
508110 M1(iii)	Quality Control Systems and Productivity	508110 M2(iii)	Green Building Design

508110M1(i): Digital Printing

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment: 25 marks

End Semester Assessment: 50 marks

1. Digital printing technologies: overview of digital printing, electro photography, ink-jet (thermal, piezoelectric, continuous), thermography, computer-to-plate (CTP), computer-to-press (direct imaging DI) etc. [8 hours]

2. Digital Prepress: digital photography, scanners, screening techniques, page description languages- PostScript, PCL, PDF (PDF/X and its flavours), raster image processor (RIP), workflow integration, color management. [8 hours]

3. Digital Proofing: technologies used for digital proofing, hard proofing, soft proofing, halftones simulation (dot proofing), remote proofing, preflight, SWOP/GRACoL certification for proofing systems. [8 hours]

4. Evaluation of Quality: objective (colorimetric) and subjective (visual) assessment of printing technology (devices), image quality attributes, print quality verification tools, standardization - ISO,SWOP, GRACoL. [8 hours]

5. Variety of Applications: customization and direct marketing, Print-on-Demand (POD), variable data printing (VDP), distribute-and-print, remote publishing (Web2Print), wide-format printing, specialty applications (particularly of inkjet) like 3D printing, printing on microscopic items etc. [8 hours]

6. Trends in Digital Printing: evolution of technologies, current market share of different technologies, promising developments (e.g. Xerox iGen3, HP Z-series inkjet printers with in-built spectrophotometer etc), future trends, eco-friendliness [8 hours]

References:

1. Brett, G, Digital Prepress Technologies, Leatherhead: Pira International, 2001.

2. Brett, G, Short-run Digital Colour Printing, Leatherhead: Pira International, 2001.

3. H. Kipphan, Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg, 2001.

4. Lake, M., The future of Digital Colour Printing: Key global markets and Forecasts, Leatherhead: Pira International, 2004.

5. Martin, G., Non-impact Printing, Leatherhead: Pira International, 1993.

6. Smyth, S., Digital Commercial Printing, Leatherhead: Pira International, 2001.

7. ABCs of Variable Data Printing, Published by EFI.

508110M1(ii): Polymer Science

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment: 25 marks

End Semester Assessment: 50 marks
Paper: 100 Marks

1) Polymers - Definition, source, structure, molecular weight, degree of polymerization, synthesis
   [8 hours]

2) Structural properties - isomers, amorphous, crystalline, cross linking, solubility [8 hours]

3) Mechanical properties - glass transition, temperatures, mechanical properties, surface properties,
   wvtr, gtr, optical properties   [8 hours]

4) Measuring techniques and analysis - DSC, microscopy, chromatography, optical testing, sample
   preparations, costs and time involvement, interpretation of different graphs [8 hours]

5) Applications - practical and theoretical applications based on single or multiple properties of a
   polymer, all applications in printing industry, nanotechnology, latest research diversity [8 hours]

6) Practical aspects - Resource availability, biodegradable materials, recyclability, process requirements,
   associated costs, laws related with polymer manufacturing, environmental factors [8 hours]

References:

1. L.H. Sprling, Inroduction To Physical Polymer Science, Published byJohn Wiley & Sons, Inc. (2005)

2. Robert O. Ebewele, Polymer science and Technology, CRC Press (2000)

3. Fred W. Billmeyer, Textbook of Polymer Science, Wiley India Edition

508110M1(iii): Quality Control Systems and Productivity

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment: 25 marks

End Semester Assessment: 50 marks

1) Introduction – Understanding Pre-Press, Printing Processes such as Offset, Flexo, Gravure, and Post-Press, Pre-Press requirements for the processes, Process configurations, Process Variables. [8 hours]

2) Printing Standards – SWOP (Specifications for Web Offset), GRACOL, IFRA, ISO Standards etc,Implementation of standards for Quality Printing, Standardization of Pre-Press & Press, Calibration Process.   [8 hours]

3) Quality Control in Printing – Density, Dot gain, Contrast, Trap, Color deviation, Color Variation,Quality control aids in Printing, Automatic Viscosity controller, Auto registration marks, Trakatron Line, Color Spaces, Gamuts, CIE LAB   [8 hours]

4) Quality Management – Quality challenges, Fundamental concepts of Quality, Quality Cost, Specification of Quality, Quality Assurance, Concepts of Six Sigma & its implementation in Printing Industry.   [8 hours]

5) Statistical Print Process Control – Process, Variations, Types of Variation, implementation of SPC, Control Charts and its types, Use of Control charts for print application, Control charts for variables, Control charts for attributes   [8 hours]

6) Process Analysis - Understanding Process Capability, Capability indices, Process Performance & indices, Corrective actions, Parametric and Non-parametric, Analysis of Variance concepts [8 hours]

References:

1. Ken Holmes, Implementing ISO 9000, PIRA International, 1995.

2. Ken Holmes, Total Quality Management, PIRA International, 1992.

3. Gravure Process and Technology, Gravure Education Foundation and Gravure Association of America, 2003.

4. SWOP Publication.

5. Harry B. Smith, Modern Gravure Technology, Pira International, 1994.

6. Flexography-Principles and Practices, Volume 1-6, FFTA, 5th Edition, 1999.

7. Tony White, High Quality Flexography, Pira International, 1998.

8. Miles Southworth, Donna Southworth, Quality & Productivity in Graphic Arts, Graphic Arts Pub. Co, 1989.

9. J. Juran, Handbook of Quality Control, Tata Mc Graw Hill Publication, 5th Edition, 1951.

10. Douglas H. W. Allan, Statistical Quality Control: An Introduction for Management, Reinhold Pub. Corp, 1959.

508110M2(i): ARTIFICIAL INTELLIGENT TOOLS

Teaching Scheme   **Examination Scheme**
Lectures: 1 Hr/Week   In-Semester Examination: 25 Marks
Credit : 1

Unit 1: Fuzzy Logic System

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control. Fuzzification, inferencing and defuzzification. Fuzzy knowledge and rule bases. Fuzzy modeling and control schemes for nonlinear systems. Self-organizing fuzzy logic control. Case studies and assignment based on applications of fuzzy logic.

[7Hrs]

Unit 2 : Genetic Algorithm

Basic concept of Genetic algorithm and detail algorithmic steps, adjustment of free parameters. Concept on some other search techniques like tabu search and and-colony search techniques for solving optimization problems. GA application to power system optimization problem, Case studies: based on use of GA for optimization. [7Hrs]

Text Books:
1) M. Ganesh "Introduction to Fuzzy Sets and Fuzzy Logic", Prentice Hall, India.
2) Zimmerman H.J. "Fuzzy set theory-and its Applications"-Kluwer Academic Publishers, 1994.

Reference Books:
1) KOSKO B. "Neural Networks And Fuzzy Systems", Prentice-Hall of India Pvt. Ltd., 1994.
2) KLIR G.J. & FOLGER T.A. "Fuzzy sets, uncertainty and Information", Prentice-Hall of India Pvt. Ltd., 1993.
3) Driankov, Hellendroon, "Introduction to Fuzzy Control", Narosa Publishers.

<div align="center">**508110M2(ii): DISASTER MANAGEMENT**</div>

Teaching Scheme   **Examination Scheme**

Lectures: 1 Hr/Week   In-Semester Examination : 25 Marks

Credit: 1

Unit 1 Disaster, Hazards and Vulnerability

Concept of disaster, different approaches, concept of risk, levels of disasters Disaster phenomena and events, Natural and man-made hazards; response time, frequency and forewarning levels of different hazards, Characteristics and damage potential of natural hazards; hazard assessment , dimensions of vulnerability factors; vulnerability assessment, Vulnerability and disaster risk, Vulnerabilities to flood and earthquake hazards. [7 Hrs]

Unit 2 Disaster management mechanism and Planning

Concepts of risk management and crisis management, Disaster management cycle Response and Recovery , Development, Prevention, Mitigation and Preparedness Planning for relief , Strategies for disaster management planning , Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India, Organizational structure for disaster management in India, Preparation of state and district disaster management plans. [7Hrs]

Students shall submit a detailed case study report on any disaster, prevention and preparedness.

Text books:

1.   Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.

2.   Carter. W. N., Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.

3.   Chakrabarty U. K., Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

4.   Disaster Management, Lotus Publications Pvt. Ltd.

Reference Books:

1.   Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

2.   Disaster Management in India, Ministry of Home Affairs, Government of India, New   Delhi, 2011.

3.   National Policy on Disaster Management, NDMA, New Delhi, 2009.

4.   Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.

5.   http://nidm.gov.in/ - National Institute of Disaster Management (NIDM) (Ministry of Home Affairs, Govt. of India) website

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508110M2(iii)GREEN BUILDING DESIGN

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Teaching Scheme	**Examination Scheme**
Lectures: 1 Hr/Week	In-Semester Examination : 25 Marks
Credit : 1	

Unit1 : Sustainability and Building design

Sustainability, objectives of sustainable development, Sustainable aspects of habitat design, sustainable buildings, principles, approaches and characteristics, climate data, climate parameters and zones, comparative analysis of various climatic zones, site planning recommended check list for identifying site characteristics, site development and layout. Efficient water management and waste water treatment, solid waste management. [7 Hrs]

Unit 2 : Energy efficiency :

Solar passive techniques in building design to minimize load on conventional system i.e. heating, cooling, ventilation and lighting. Designing Energy efficient lighting and HVAC systems. Use of renewable energy system to meet part of building load. Green building certification. Overview various green building in India. Policy and regulatory mechanism. [7 Hrs]

Text Book :

Seven wonders of Green Building Technology- Karen Sirvaitis, Twenty first century books.

References :

1. Sustainable Building Design Manual, Volume 2, TERI, New Delhi
2. Energy Efficient Buildings in India, TERI, New Delhi
3. Sustainable Building Design Manual, Volume 1 TERI, New Delhi

508111: Lab Practice II

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

TW : 50 marks

Oral/Presentation: 50 marks

A minimum of eight experiments should be performed under Lab Practice – II.

<u>List of Experiments</u>

1. Profile making for hexachrome, pantone and customized spot colors
2. Rebuild a new profile by replacing few spot colors by their nearest color in existing ICC profile.
3. Multicolor separations and ICC soft proofing.
4. Comparison of ICC soft proofing and hard proofing.
5. Create a Device link for direct connection between source and destination imaging devices.
6. Calibration of inkjet printer
7. Dot structure analysis of image
8. DOE, ANOVA and regression analysis.
9. Capability analysis and performance of process
10. Effect of shore hardness on printability

508112: SEMINAR– I

Teaching Scheme
4 Hrs / week
Credits: 04

Examination Scheme
Term work: 50 Marks
Oral/ Presentation: 50Marks

Seminar I **:** Shall be on state of the art topic of student's own choice approved by an authority. The student shall submit the duly certified seminar report in standard format, for satisfactory completion of the work by the concerned Guide and head of the department/institute.

608101: Printed Electronics and RFID

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment: 50 marks

End Semester Assessment: 50 marks

1. Introduction to Printed Electronics – Background, Stretchable Electronics, Foldable Electronics, Rollable electronics, Edible electronics, Wearable and Portable electronics, Electronic Packaging, Interactive Paper [8 hours]

2. Traditional Electronics Manufacturing Methods, Use of Printing methods – Offset, Screen, Gravure, Flexography, Inkjet Printing, Electrostatic Printing, Standards for Printed Electronics [8 hours]

3. Substrates for Printed Electronics – Use of Paper and Polymer substrates for low cost electronics, Properties required for use in printed electronics. [8 hours]

4. Inks for Printed Electronics – Conductive, Semi conductive, Dielectric, Ferrite layers for building electronic structures, materials used for manufacturing different functional inks needed for printed electronics. Properties of functional inks. [8 hours]

5. RFID - Printing UPC Bar Codes, Why RFID Will Replace UPC?, RFID Tag Construction RFID Infrastructure The Economic Benefits, Active and Passive RFID Tags, RFID Tag Frequencies RFID, Tag Communication ,RFID Smart Cards, Electronic Article Surveillance (EAS), Identifying and Tagging Everything [8 hours]

6. Other Applications of Printed/Organic Electronics – Flexible Displays, Signage's, Power, Photovoltaic and Batteries, Lighting, Memory and Logic, Healthcare management etc. [8 hours]

References:

1. "Printed Electronicsand the AutomaticIdentification of Objects"-An Investigation of the Emerging and DevelopingTechnologies Related to the Generation BeyondPrint-on-Paper, Michael L. Kleper, Paul and Louise Miller Distinguished Professor, School of Print Media, Rochester Institute of Technology

2. Flexible and Printed Electronics for Displays and Image Sensors Jurgen Daniel A.C. Arias, W. Wong, S.E. Ready, T. Ng, B. Krusor, R. Lujan, R.A. Apte, J.P. Lu, M.L. Chabinyc, R.A. Street Palo Alto Research Center Palo Alto, CA

3. IDTechEx Publications

4. ObservatoryNANO, ICT Sector Focus Report on Printed Electronics, April 2010

5. Introduction to Printed Electronics and Intelligence, Dr. Jukka Hast VTT Technical Research Centre of Finland(2012)

608102: Advances in Converting and Packaging

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment: 50 marks
Credits: 4	End Semester Assessment: 50 marks

1. Introduction – Principles, Modern developments in converting style, online integrated machines using CIP3, CIP4, inline printing & converting machines for various applications such as die-cutting, punching, labels, Holograms & its importance in Packaging.   [8 hours]

2. Finishing technique – Advancement in loose leaf and adhesive binding, stationery and publication binding, integrated machines for finishing and packaging, Embossing, Coatings and Varnishing. [8 hours]

3. Converting Technique – Adhesives for converting and packaging, Lamination techniques such as Dry lamination, Wet lamination, Thermal, Hot-Melt, Extrusion, Solvent-less lamination and its benefits over solvent based lamination, Faults in Lamination & its Remedies, Surface treatments such as Corona, Flame & its importance in Printing and Packaging.   [8 hours]

4. Converting Processes – Extrusion process, Co- extrusion techniques, Shrink and Stretch Wrapping, Advantages of wrapping technique, Computer aided Design for package   [8 hours]

5. Various forms of pouches – Stand-up Pouches, Bag in Box for solid and liquid, Packages for food products, Microwave packaging, PET bottles for food packaging.   [8 hours]

6. Selection criteria for packaging – Developments in barrier technology, Retort Packaging, Aseptic Packaging, Aseptic techniques, Benefits of Aseptic Packaging, Applications, Automatic pouching machines. [8 hours]

References:

1. T. J. Tedesces, Binding, Finishing and mailing, The final Word, GATF Publication, 1999

2. Ralph Lyman, Binding and Finishing, GATF Publication, 1999.

3. John Birkanshaw, Finishing for Customer, PIRA International, 1995.

4. Dale Diu, Binder Technology, PIRA International, 2nd Edition, 1986.

5. Modified Atmosphere Food Packaging by Aaron Brody, PIRA Publication.

6. Aaron L. Brody, Kenneth S. Marsh, Encyclopedia of Packaging Technology, A Wiley-Interscience Publication, 2nd Edition, 1997.

7. Frank Albert Paine, Heather R. Paine, Handbook of Food Packaging, Institute of Packaging, 2nd Edition, 1992.

8. A. S. Athayle, Plastics in Packaging, Tata McGrawHill Publication, 1992.

9. M. Mahadevian, R. V. Gowramma, Food Packaging Materials, Tata Mc Graw Hill Publication, 1996.

10. Stanley Sachavow and Robert Schiffmann, Microwave Packaging, PIRA International, 1992.

11. David Shires, Developments in Barrier Technology, PIRA International, 1993.

(ELECTIVE - III)

CODE	TEACHING SCHEME	EXAMINATION SCHEME						CREDITS
		Paper		TW	Oral / Presentation	Total		
608103	Lect/week	In semester Assessment	End Semester Assessment					
	5	**50**	**50**	**-**	**-**	**100**	**5**	

Code No.	Modules of 4 credit (Select any one)	Code No.	Modules of 1 credit (Select any one)
608103 M1(i)	Multimedia Systems and Communication	608103 M2(i)	Human Rights
608103 M1(ii)	Ink Technology	608103M2(ii)	Technical Communication

<center>**Elective III**</center>

<center>**608103M1(i): Multimedia Systems & Communication**</center>

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours / Week	In Semester Assessment: 25 marks
Credits: 4	End Semester Assessment: 50 marks

1. Latest developments in multimedia, video, television graphics, animated television graphics, collaboration of different media such as audio, video & animation, authoring. [8 hours]

2. Images in multimedia, digital imaging, image editing, introduction to oops, applying object design to animation process, interactive devices, types of monitors, light pens.   [8 hours]

3. Multimedia standards, formats, compression techniques, streaming media, interactivity, recording, editing, morphing. [8 hours]

4. Future of multimedia, software agents, internet radio, internet chat, Online Shopping. [8 hours]

5. Web basics, web publishing, Programming languages such as HTML, DHTML, XML for web page creation, front page software used for creation of web page, internet addresses, IP addresses, protocol and layering, Blogging, Chatting, Mobile communication Systems, Browser and security, search engines, bookmarks. [8 hours]

6. Digital Camera Work, Resolution, Color, Camera Raw, Capturing for Press & online, Meta data & Asset management. [8 hours]

References:

1. William Stallings, Data and Computer Communications, Pearson Prentice Hall, 5th edition.

2. Andrew .S. Tannenbaum, Computer Network, Prentice Hall PTR, 2002.

3. Jessica Keyes, Multimedia Handbook, Mc Graw Hill Publication, 1994.

608103M1(ii) : Ink Technology

Teaching Scheme

Lectures: 4 Hours / Week

Credits: 4

Examination Scheme

In Semester Assessment : 25 marks

End Semester Assessment: 50 marks

1. Introduction to Print Process and ink requirement with respect to the print process -
   Study of screen, lithography, gravure, flexography, inkjet, electrophotography, thermography etc., relevant importance of each process and their ink requirements. [8 Hours]

2. Raw materials used in Inks -
   Study of organic and inorganic pigments, particle size distribution of pigments used in each print process and its relevance to the print process and print quality. Various dyes used for digital printing ink. Base schemes used for inks for different print process and substrate, different types of resins used, oils and solvents used, additives used. Ink formulation for all conventional and digital printing processes, physical characteristics . [8 Hours]

3. Manufacturing and Storage of Paste & Liquid Inks -
   Preparation of varnishes- Oleo resinous varnish and Non Oleo resinous varnish manufacture; Dispersal of Pigments by different types of equipments- threes roll mill, bead mill, cavitation mixers .
   [8 Hours]

4. Ink Color and Ink Drying -
   Young-Helmholtz theory of three color vision, Chemical & physical principles of ink drying, its relationship with ink type, printing processes & substrates, drying system - heating action, UV & EB, microwave, convection . [8 Hours]

5. Ink Rheology-
   Introduction to rheology, shear rate, shear stress, dynamic viscosity, kinematic viscosity, flow curves, viscosity curves, Newtonian liquids, non-Newtonian liquids, visco-elastic liquids, study of viscometers, rheometers, rheological equations . [8 Hours]

6. Ink Testing and Control
   Testing of raw materials- pigments, resins etc. Quality control of inks, testing of finished inks and testing of printing inks, environment friendly inks. . [8 Hours]

References:

1. Leach, Robert; Pierce, Ray (Eds.), The Printing Ink Manual, Springer, 5th ed. 1993

2. NIIR Board, The Complete Technology Book on Printing Inks, Asia Pacific Business Press Inc, 2003

3. Apps E. A, Printing Ink Technology, Leonard Hill (Books) Ltd. Efen Street, London, 1958.

4. Ronald E.; Printing Inks Pira International Ronald E. Todd, Leatherhead, 1996.

5. Chris H. Williams; Printing Ink Technology, Pira International, 2001.

6. Dr. Nelson R. Eldered, What Printer Should Know About Ink, GATF Press Pittsburgh, 2001.

7. Laden P. O, Chemistry & Technology of Water based Inks, Blackie Academic & Professional - Imprint of Chapmall Hall, 1st Edition, 1997

608103 M2 (i): Human Rights

Teaching Scheme   **Examination Scheme**

Lectures: 1 Hr/Week   In-Semester Examination: 25 Marks

Credit : 1

Unit 1:
Human Rights – Concept, Development, Evolution
- Philosophical, Sociological and Political debates
- Benchmarks of Human Rights Movement.
Human Rights and the Indian Constitution
- Constitutional framework
- Fundamental Rights & Duties
- Directive Principles of State Policy
- Welfare State & Welfare Schemes
Human Rights & State Mechanisms
- Police & Human Rights
- Judiciary & Human Rights
- Prisons & Human Rights
- National and State Human Rights Commissions   [7 Hrs]

Unit 2 :
Human Rights of the Different Sections and contemporary issues
- Unorganized Sector
- Right to Environment,
- Globalization and Human Rights
- Right to Development,
Citizens' Role and Civil Society
- Social Movements and Non-Governmental Organizations
- Public Interest Litigation
- Role of Non Government organizations in implementation of Human rights.
- Right to Information
Human Rights and the international scene –Primary Information with reference to Engineering Industry
- UN Documents
- International Mechanisms (UN & Regional)
- International Criminal Court   [7Hrs]

References:
1) Study material on UNESCO,UNICEF web site
2) HUMAN RIGHTS IN INDIA A MAPPING, Usha Ramanathan

   Available at: http://www.ielrc.org/content/w0103.pdf
3) Introduction to International Humanitarian Law by Curtis F. J. Doebbler **-** CD Publishing **,** 2005.
4) Freedom of Information by Toby Mendel **-** UNESCO**,** 2008

608103M2(ii): Technical Communication

Teaching Scheme
Lectures: 1 Hr/Week
Credit: 1

Examination Scheme
In-Semester Examination : 25 Marks

Unit 1
Effective Presentation Strategies
Define the purpose of presentation, Analyzing audience and locale, organizing contents, Preparing an Outline, Visual Aids, Understanding the nuance of delivery, sample speech and practice the presentation.

[3Hrs]

Listening techniques
Types of listening, listening with a purpose, barriers to listening, listening comprehension, effective listening strategies, listening in conversational interaction, team listening. [2Hrs]

Speech techniques
Conversation and oral skills, strategies for good conversation, techniques to develop effective word accent, word stress, primary and secondary stress, use of correct stress pattern, developing voice quality, developing correct tone.   [2Hrs]

Unit 2:
Writing technical reports, research papers, dissertation, thesis and research proposals. Important parts of reports like abstract, results, conclusion. Supplementary parts like list of symbols, list of tables, annexure, references etc. Making title page, writing mathematical equations, including graphics, making tables and writing references using LaTex/ MiKTeX.
Assignment for one technical proposal, one research paper and one technical report should be submitted using LaTex/MikTeX for in semester assessment. [7 Hrs]

Reference books
1) Technical Communication-Principals and Practice, Meenakshi Raman, Sangeeta Sharma, OXFORD university Press.
2) Effective Technical Communication, M Ashraf Rizvi, TATA McGRAW HILL
3) Leslie Lamport, ' Latex: A document preparation system' Addison Wesley, Reading, Massachusetts, second edition, 1994, ISBN 0-201-52983-1.

608104: Seminar II

Teaching Scheme	Examination Scheme
Lectures: 4 Hours / Week	TW: 50 marks
Credits: 4	Oral/Presentation: 50 marks

The student is required to deliver a seminar in second semester on the topic relevant to latest trends in Printing Engineering preferably on the topic of sub specialization based on the Electives selected by him/her by authority. The student shall submit the seminar report in standard format, duly certified for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

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608105: Project Stage I

Teaching Scheme	Examination Scheme
Practical: 08 Hours / Week	Term Work: 50 Marks
Credits: 8	Oral: 50 Marks

Project Stage – I is the integral part of the dissertation project. The project should be based on the knowledge acquired by the student during the coursework and should contribute to the needs of the society. The project aims to provide an opportunity of designing and building complete system or subsystems in an area where the student likes to acquire specialized skills.

The student shall complete the part of the Project that will consist of problem statement, literature review; project overview, scheme of implementation (Mathematical Model/block diagram/ PERT chart, etc.) and Layout & Design of Setup. As a part of project stage I the student shall deliver a presentation on advancement in Technology pertaining to selected topic.

The student shall submit the report of Project work completed partly in standard format approved by the University.

608106: Seminar III

Teaching Scheme: **Examination Scheme:**

Practical: 5 Hrs. /Week   Term Work: 50 marks

Credits: 5   Oral /Presentation: 50 Marks

Seminar III: shall preferably an extension of seminar II**.** The student shall submit the duly certified seminar report in standard format, for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

608107: Project Stage II

Teaching Scheme	**Examination Scheme**
Lectures: 20 Hours / Week	TW : 150 marks
Credits: 20	Oral/Presentation: 50 marks

Project Work Stage - II In Project Work Stage – II, the student shall complete the remaining part of the project which will consist of the fabrication of set up required for the project, work station, conducting experiments and taking results, analysis & validation of results and conclusions.

The student shall prepare the duly certified final report of project work in standard format for satisfactory completion of the work by the concerned guide and head of the Department/Institute.