Bachelor of Technology
(Printing and Packaging)

Syllabus 2017
(Proposed Credit Distribution Scheme under CBCS)

Department of New Media Technology

Makhanlal Chaturvedi Rashtriya Patrakarita Evam Sanchar Vishwavidyalaya

B-38, Vikas Bhawan, Press Complex, M.P. Nagar, Zone-I, Bhopal – 462011

1/9/17

B. Tech. (Printing and Packaging)

1. Introduction to the Department

The future of media lies in convergence. The democratic power of mass communication is being realized through New Media which makes every individual to contribute, participate and consume the media content. Multimedia, Graphics and Animation, Printing and Packaging are shaping these media content. The **Department of New Media Technology** is one of the creative departments that cater to the converging needs of the media industry. It was established in the year 2011 with a motive to introduce, adapt and elevate the students in using the new technologies in media. The Department offers courses including B.Sc. (Multimedia), B.Sc. (Graphics and Animation), B.Tech. (Printing and Packaging), M.A. (New Media Content Design) and M.Sc. (New Media).

The department offers courses and undertakes interdisciplinary projects in the latest area of New Media. As the disciplines of art, technology, and information science collide, computer graphics and multimedia are presenting a myriad of applications and problems to professionals and scholars in Computer Science, Information Science, Digital Art, Multimedia, Educational Technology and Media Arts. Recent advances in computing, networking, storage and information technology have enabled the collection and distribution of vast amount of multimedia data in a variety of applications such as entertainment, education, environmental protection, e-commerce, public safety, digital government, homeland security, and manufacturing. The proliferation of multimedia data and its rich semantics have created the needs for advanced techniques for in-depth content processing, analysis, indexing, learning, mining, searching, management, and retrieval. Hence there is a lot of scope for this applied field of New Media Technology.

2. Course Objectives

The space of digital media is widening day-by-day where Printing is overlapped by Packaging. An increased focus in digital packaging, has led to digitally printed packaging opportunities and commercial digital printers looking to establish packaging operations. But lack of trained manpower is one of the biggest issues to be addressed. Keeping this in view, the University introduces B. Tech. (Printing and Packaging) in response to a growing demand for trained Printing and Packaging professionals. The course provides a comprehensive practical exposure in all aspects of printing and packaging processes.

Focus on both existing and new technology skills and knowledge used throughout the production will prepare the learners for the existing, diverse and technically advancing Printing and Packaging industry.

The course content includes Printing and Packaging Technologies, Screen printing, Sheet fed offset printing, Flexography, Gravure, Web offset, Multimedia Technology, Graphics design for Printing and Packaging. State of art facilities are created in the department to provide complete practical exposure to the students along with working opportunity in University Press.

3. Eligibility and Duration

Eligibility: **Passed 10+2 exam with Physics, Chemistry/Computer, Mathematics or equivalent and for lateral entry passed 3 years diploma course from a recognized institution in Printing/Packaging/ Printing & Packaging/B.Sc.**

Duration: **4 years (3 years for lateral entry)**

4. Career opportunities

The course empowers the students with ample job opportunities like Chief Production Officer, Production Officer, Production Officer, Assistant Director (Production), Technical Officer, Printing Officer, Manager Printing, Supervisor, Publication Officer in the field of printing and packaging industry. Also, they can work for Designing and Digital printing, Security printing, Software solution for print industry, Electronic publishing, Color management solution, Packaging, Print finishing and converting, and soon. The course also trains young people to become entrepreneurs and to establish printing & packaging units and generate lot of employment.

Makhanlal Chaturvedi National University of Journalism and Communication, Bhopal

Proposed Semester wise Credit Distribution Scheme under CBCS

B. Tech. (Printing and Packaging)

(Offered by NEW MEDIA TECHNOLOGY DEPARTMENT)

SEM	Core Course (CCC) Compulsory (6 Credits Each)	Core Course Elective(CCE) (6 Credits Each)	Ability Enhancement Course (AEC) (3 Credits Each)	Skill Enhancement Course (SEC) (3 Credits Each)	Open Elective (OE) (3 Credits Each)	Total Credits
1	1. Engineering Chemistry 2. Engineering Mathematics 3. Basic Electricals & Electronics Engineering 4. Engineering Graphics		1. Communicative English and Hindi		1. Management Information System 2. TQM for Graphic Art Industry 3. Psychology of Printing and Packaging 4. Computer Applications in Printing and Packaging 5. Digital Electronic Circuits 6. Multimedia Technology 7. Advertising and Multimedia	30
2	5. Engineering Physics 6. Basic Mechanical Engineering 7. Basic Civil Engineering & Engineering Mechanics 8. Basic Computer Engineering		2. Environmental Studies			30
3	9. Basics of Printing Processes 10. Elements of Packaging 11. Printing Material Science	1. Mechanics of Machines / 2. Electrical Machines and Utilization		1. Graphics Designing		30

SEM	Core Course (CCC) Compulsory (6 Credits Each)	Core Course Elective(CCE) (6 Credits Each)	Ability Enhancement Course (AEC) (3 Credits Each)	Skill Enhancement Course (SEC) (3 Credits Each)	Open Elective (OE) (3 Credits Each)	Total Credits
4	12. Printing & Packaging Materials 13. Imaging Technology 14. Technology of Sheet fed offset Printing	3. Screen Printing / 4. Planning for Print Production		2. Packaging Design	8. International logistics and Legal Environment	30
5	15. Technology of Flexography 16. Image Carrier for Printing Process 17. Paper Based Packaging	5. Packaging Material Science / 6. Microprocessor and Microcontroller		3. Digital Pre Press	9. International Trade and Relations 10. Print Media Ethics	30
6	18. Technology of Gravure 19. Plastic & Polymer Based Packaging 20. Colour Science	7. Metal and Glass Based Packaging / 8. Print Finishing and Converting		4. Machine Design	11. Printing Management and Entrepreneurship Development 12. Image Processing	30
7	21. Technology of Web Offset 22. Ink Technology 23. Specialized Packaging	9. Machine Maintenance Management / 10. Printing Plant and Layout Design		5. Industrial Training	13. Quality Control and Supply Chain Mgmt 14. Industrial Safety Mgmt.	30
8	24. Security and specialized Printing 25. Estimating and Costing 26. Major Project	11. Digital & Advance Printing Processes / 12. Printed Electronics		6. Food and Agro based Packaging		30

Scheme for B.Tech. (Printing and Packaging)

SEMESTER - 1

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
1BTech(PP)1	CCC1	4751	Engineering Chemistry	6	4	1	2	50	30	20	100
1BTech(PP)2	CCC2	4752	Engineering Mathematics	6	4	2	0	80	0	20	100
1BTech(PP)3	CCC3	4753	Basic Electricals & Electronics Engineering	6	3	1	4	50	30	20	100
1BTech(PP)4	CCC4	4754	Engineering Graphics	6	3	1	4	50	30	20	100
1BTech(PP)5	AEC1	4755	Communicative English and Hindi	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 2

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
2BTech(PP)1	CCC5	4770	Engineering Physics	6	4	1	2	50	30	20	100
2BTech(PP)2	CCC6	4771	Basic Mechanical Engineering	6	3	1	4	50	30	20	100
2BTech(PP)3	CCC7	4772	Basic Civil Engineering & Engineering Mechanics	6	4	1	2	50	30	20	100
2BTech(PP)4	CCC8	4773	Basic Computer Engineering	6	3	1	4	50	30	20	100
2BTech(PP)5	AEC2	4774	Environmental Studies	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 3

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
3BTech(PP)1	CCC9	4775	Basics of Printing Processes	6	3	1	4	50	30	20	100
3BTech(PP)2	CCC10	4776	Elements of Packaging	6	4	2	0	80	0	20	100
3BTech(PP)3	CCC11	4777	Printing Material Science	6	4	2	0	80	0	20	100
3BTech(PP)4.1	CCE1	4778	Mechanics of Machines	6	3	1	4	50	30	20	100
3BTech(PP)4.2	CCE2	4779	Electrical Machines and Utilization								
3BTech(PP)5	SEC1	4780	Graphics Designing	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 4

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
4BTech(PP)1	CCC12	4781	Printing & Packaging Materials	6	4	2	0	80	0	20	100
4BTech(PP)2	CCC13	4782	Imaging Technology	6	3	1	4	50	30	20	100
4BTech(PP)3	CCC14	4783	Technology of Sheet fed offset Printing	6	3	1	4	50	30	20	100
4BTech(PP)4.1	CCE3	4784	Screen Printing	6	3	1	4	50	30	20	100
4BTech(PP)4.2	CCE4	4785	Planning for Print Production								
4BTech(PP)5	SEC2	4786	Packaging Design	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 5

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
5BTech(PP)1	CCC15	4787	Technology of Flexography	6	3	1	4	50	30	20	100
5BTech(PP)2	CCC16	4788	Image Carrier for Printing Process	6	3	1	4	50	30	20	100
5BTech(PP)3	CCC17	4789	Paper based Packaging	6	4	2	0	80	0	20	100
5BTech(PP)4.1	CCE5	4790	Packaging Material Science	6	3	1	4	50	30	20	100
5BTech(PP)4.2	CCE6	4791	Microprocessor & Microcontroller								
5BTech(PP)5	SEC3	4792	Digital Pre Press	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 6

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
6BTech(PP)1	CCC18	4793	Technology of Gravure	6	3	1	4	50	30	20	100
6BTech(PP)2	CCC19	4794	Plastic & Polymer Based Packaging	6	4	2	0	80	0	20	100
6BTech(PP)3	CCC20	4795	Colour Science	6	3	1	4	50	30	20	100
6BTech(PP)4.1	CCE7	4796	Metal and Glass Based Packaging	6	3	1	4	50	30	20	100
6BTech(PP)4.2	CCE8	4797	Print Finishing and Converting								
6BTech(PP)5	SEC4	4798	Machine Design	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 7

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
7BTech(PP)1	CCC21	4799	Technology of Web Offset	6	3	1	4	50	30	20	100
7BTech(PP)2	CCC22	4800	Ink Technology	6	3	1	4	50	30	20	100
7BTech(PP)3	CCC23	4801	Specialized Packaging	6	4	2	0	80	0	20	100
7BTech(PP)4.1	CCE9	4802	Machine Maintenance Management	6	4	1	2	50	30	20	100
7BTech(PP)4.2	CCE10	4803	Printing Plant and Layout Design								
7BTech(PP)5	SEC5	4804	Industrial Training	3	0	0	3	0	40	10	50
BTech (PP)6	OE		Select any one from open electives								

SEMESTER - 8

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
8BTech(PP)1	CCC24	4805	Security and Specialized Printing	6	4	2	0	80	0	20	100
8BTech(PP)2	CCC25	4806	Estimating and Costing	6	4	2	0	80	0	20	100
8BTech(PP)3	CCC26	4807	Major Project	6	0	2	8	0	80	20	100
8BTech(PP)4.1	CCE11	4808	Digital & Advance Printing Processes	6	3	1	4	50	30	20	100
8BTech(PP)4.2	CCE12	4809	Printed Electronics								
8BTech(PP)5	SEC6	4810	Food and Agro based Packaging	3	3	0	0	40	0	10	50
BTech (PP)6	OE		Select any one from open electives								

Open elective

Subject Code	Course of study	Paper Numerical Value	Subject Name	Credit	Contact Hours			Marks			
					L	T	P	Th.	P	IA	Total
BTech(PP)6	OE1	4756	Management Information System	3	3	0	0	40	0	10	50
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry	3	3	0	0	40	0	10	50
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging	3	3	0	0	40	0	10	50
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging	3	3	0	0	40	0	10	50
BTech(PP)6	OE5	4760	Digital Electronic Circuits	3	3	0	0	40	0	10	50
BTech(PP)6	OE6	4761	Multimedia Technology	3	3	0	0	40	0	10	50
BTech(PP)6	OE7	4762	Advertising & Multimedia	3	3	0	0	40	0	10	50
BTech(PP)6	OE8	4763	International Logistics and Legal Environment	3	3	0	0	40	0	10	50
BTech (PP)6	OE9	4764	International Trade and Relations	3	3	0	0	40	0	10	50
BTech(PP)6	OE10	4765	Print Media Ethics	3	3	0	0	40	0	10	50
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development	3	3	0	0	40	0	10	50
BTech(PP)6	OE12	4767	Image Processing	3	3	0	0	40	0	10	50
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management	3	3	0	0	40	0	10	50
BTech(PP)6	OE14	4769	Industrial Safety Management	3	3	0	0	40	0	10	50

Course	Engineering Chemistry	Marking Scheme			Credits
		T	P	I	
1BTech(PP)1		50	30	20	6 (CCC1)

Objective: To understand the basic concept of chemistry and related terms.

Unit I: Water And its Industrial Applications

Sources, Impurities, Hardness & its units, Disadvantage of hard water – Scale and sludge in Boiler, Preventive methods, caustic embrittlement, Boiler corrosion, Priming and Foaming. Water softening methods – Soda-lime, Zeolite and Demineralization, Chemical analysis of water- alkalinity, complexometric titration for hardness. Numerical problems based on softening methods.

Unit II: Corrosion

Dry and wet corrosion – oxidation, electrochemical corrosion, Galvanic corrosion, pitting corrosion, water-line corrosion, differential aeration corrosion, stress corrosion, Factors influencing corrosion, Protection against corrosion. Protective coatings – Electroplating, Methods of cleaning articles, Electroplating methods, Electroless plating, Other metallic coatings, Organic coatings – Paints, pigments, vehicles, thinner, driers, extenders, varnish and lacquers.

Unit III: Lubricants

Introduction, mechanism, classification, properties and Testing of lubricating oils-Viscosity, Flash and fire point, Cloud and pour point etc, Selection of Lubricants. Basics of Photochemistry: Classification, characteristics, Laws of Photochemistry, Photosensitization application in photography

Unit IV: High- Polymer

Nomenclature, types and classification of polymers, Polymerisation reaction mechanism, Preparation, Properties & uses of – Thermoplastic resins-Polyethylene, PVC, PVA, Polystyrene, PMA, PMMA, Teflon, Poly acrylonitrile, Polyamides- Nylon 6, Nylon 6:6.,Terylene. Thermoset resins- Phenol formaldehyde, Urea - Formaldehyde Resin, Glyptal. Silicone Resin, Polyurethanes.

Unit V: Analysis & Techniques

A. Instrumental Techniques In Chemical Analysis: Spectroscopy- Introduction, Principle, Instrumentation and applications of IR, UV, Visible, Atomic emission spectroscopy – Flame Photometry and Gas Chromatography. B. Thermal Analysis Techniques: Thermogravimetry (T.G), Differential Thermal Analysis (DTA) and Differential scanning Colorimetry.

Assignments/Practical Work:

NOTE: At least 10 of the following core experiments must be performed during the session.

1. Water Testing
   - (i) Determination of Total hardness by Complexometric titration method.
   - (ii) Determination of mixed alkalinity
     - (a) OH & $C0_3$
     - (b) $C0_3$ & HCO_3
2. Lubricant testing:
   - (i) Flash & fire points determination by
     - a) Pensky Martin Apparatus,
     - b) Abel's Apparatus,
     - c) Cleveland's open cup Apparatus.
   - (ii) Viscosity and Viscosity index determination by
     - a) Redwood viscometer No.1
     - b) Redwood viscometer No.2
   - (iii) Steam emulsification No & Anline point determination
   - (iv) Cloud and Pour point determination of lubricating oil

Text & Reference Books:

1. Engineering Chemistry by Wiley India (Author) ISBN-10 8126519886 Year 2011
2. Engineering Chemistry by Jain and Jain, Published by Dhanpat Rai Publishing Company. ISBN-10: 9352161319 Year 2016
3. A Text Book of Engineering Chemistry - S. S. Dara & S. S. Umare, S. Chand Publication. ISBN-10: 8121903599 Year 2004

4. Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age Pub.ISBN-10 8122408141 Year 1995
5. Polymer Science & Technology – Ghosh, Tata McGraw Hill.III Edition ISBN-10: 0070707049 Year 2010
6. Engineering Chemistry- Sivasankar, Tata McGraw-Hill Education I Edition ISBN-10 0070669325 Year 2008
7. Technology of Synthetic Resins and Emulsion Polymers – Dr. Himadri Panda, Engineers India Research Institute ISBN-10 8189765965 Edition 2011
8. Spectroscopy- Dr. B.K.Sharma, Krishna Prakashan Media. ISBN-10: 8182836719 Year 2015

Course	Engineering Mathematics	Marking Scheme			Credits
		T	P	I	
1BTech(PP)2		80	-	20	6 (CCC2)

Objective: To know and understand the concept of mathematical functions.

Unit I: Differential Calculus

Expansion of functions by Maclaurin's and Taylor's theorem. Partial differentiation, Euler's theorem and its application in approximation and errors, Maxima and Minima of function of two variables, Curvature: Radius of curvature, centre of curvature.

Unit II: Integral Calculus

Definite Integrals: Definite Integrals as a limit of a sum, its application in Summation of series, Beta and Gamma Functions, Double and Triple Integrals, Change of Order of Integration, Area, Volume and Surfaces using double and triple Integral Curve tracing.

Unit III: Differential Equations

Solution of Ordinary Differential Equation of first order and first degree for Exact differential Equations, Solution of Ordinary Differential Equation of first order and higher degree (solvable for p, x and y, Clairauts Equation), Linear Differential Equations with Constant Coefficients, Cauchy's Homogeneous differential Equation, Simultaneous differential Equations, Method c Variation of Parameters

Unit IV: Matrices

Rank, Solution of Simultaneous equation by elementary transformation, Consistency of System of Simultaneous Linear Equation, Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem and its Application to find the inverse

Unit V: Algebra of Logic

Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic Graph Theory : Graphs, Sub graphs, Degree and Distance, Tree, cycles and Network,

Assignments/Practical Work:

1. Study of application of Differential Calculus in practice.
2. Study of application of Integral Calculus in practice.
3. Study of application of Differential Equations in practice.
4. Study of application of Matrices in practice.
5. Study of application of Algebra of logic in practice.

Text & Reference books:

1. Higher Engg. Mathematics by Ramana, Tata McGraw Hill. ISBN-10 007063419X Year 2006
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication XLIII Edition ISBN-10 8174091955 Year 2014
3. Advance Engineering Mathematics with MATLAB by D.G.Duffy CRC Press; III Edition ISBN-10 1439816247 Year 2010
4. Engineering Mathematics by S S Sastri. P.H.I. ISBN-10 8120308042 Year 2004
5. Mathematics for Engineers by S. Arumugham, Scitech Publication ISBN-10: 8183711359 Year 2011
6. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India X Edition ISBN-10 8126531355 Year 2015

Course	Basic Electrical & Electronics Engineering	Marking Scheme			Credits
		T	P	I	
1BTech(PP)3		50	30	20	6 (CCC3)

Objective: To know and understand the basic concept of Electrical science.

Unit I: Electrical circuit analysis

Voltage and current sources, dependent and independent sources, source conversion, DC circuits analysis using mesh & nodal method, Thevenin's & superposition theorem, star-delta transformation.1-phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning of reactive power, power factor, 3-phase balanced and unbalanced supply, star and delta connections.

Unit II: Transformers

Review of laws of electromagnetism, emf, flux, and their relation, analysis of magnetic circuits. Single-phase transformer basic concepts and construction features, voltage, current and impedance transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC test.

Unit III: Rotating Electric machines

Constructional details of DC machine, induction machine and synchronous machine, Working principle of 3-Phase induction motor, emf equation of 3-Phase induction motor, Concept of slip in 3- Phase induction motor, Explanation of Torque-slip characteristics of 3-Phase induction motor, Classification of self excited DC motor and generator.

Unit IV: Digital Electronics:

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion floating point and signed numbers, Demorgan's theorem, AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates and their representation, truth table, half and full adder circuits, R-S flip flop, J-K flip flop.

Unit V: Electronic Components and Circuits

Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT, DC biasing of BJT.

Assignments/Practical Work:

1. Verifications of Thevenin's Superposition theorem.
2. Study of Transformer, name plate rating, determination of rayio and polarity.
3. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
4. Separation of resistance and inductance of choke coil.
5. Measurement of various line & phase quantities for a 3-phase circuit.
6. Identification of different Electronics components.
7. Observing input and output waveforms of rectifiers.
8. Transistor application as amplifier and switch.

Text & Reference books:

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition ISBN-10 812030599X Year 1989
2. S. Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition. ISBN-10 8120332997 Year 2007
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition ISBN-10 0070151420 Year 2009
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH. ISBN-10 007014611X Year 2009
5. J.S. Katre, Basic Electronics Engg, Max Pub. Pune.ISBN-10 9350779644 Year 2016
6. Hughes, Electrical and Electronic Technology, Pearson Education India X Edition ISBN-10 8131733661 Year 2010

Course	Engineering Graphics	Marking Scheme			Credits
		T	P	I	
1BTech(PP)4		50	30	20	6 (CCC4)

Objective: To know and understand the concept of Engineering Drawing and Graphics.

Unit I: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Unit II: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

Unit III: Projections of Regular Solids

Projection of solids inclined to both the Planes- Auxiliary Views;

Unit IV: Sections of solids & Development of Surfaces

Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone;

Unit V: Isometric Projections & CAD

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

Assignments/Practical Work:

1. Sketching and drawing of geometries and projections based on above syllabus

Term work:

1. A min. of 30 hand drawn sketches (on size A4 graphic sketch Book) plus 5 CAD-printouts on size A4 sheets plus 10 sheets of size A2 or 6 sheets of size A1, (50% marks to be allotted for this record + 25% marks for attendance +25%marks for Teachers Assessment
2. Practical Marks to be allotted based on written test and viva.
3. Note: To cover above syllabus, the University must have CAD software and a computer lab (6 to 12 hrs/month/student).

Text & Reference books:

1. Computer Aided Engg drawing, VTU, I K International Publishing House III Edition ISBN-10: 8188237949 Year 2007
2. Bhatt N.D.; Engineering Drawing, Charotar Publishing House LIII Edition ISBN-10: 9380358962 Year 2014
3. Venugopal K.; Engineering Graphics; New Age International Publishers ISBN-10: 8122438016 Year 2015
4. John KC; Engg. Graphics for Degree;PHI. I Edition Year 2009
5. Gill P.S.; Engineering Drawing; S.K. Kataria & Sons; ISBN-10: 9350143151 Year 2013
6. Jeyapoovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas Publishing House; III edition ISBN-10: 8125940006 Year 2010
7. Agrawal and Agrawal; Engineering Drawing;TMH II Edition ISBN-10: 1259062880 Year 2013
8. Shah MB and Rana BC; Engg.drawing; Pearson Education II Edition ISBN-10: 8131710564 Year 2009
9. Luzadder WJ and Duff JM; Fundamental of Engg Drawing; PHI
10. Jolhe Dhananjay; Engg. Drawing with an Introduction to AutoCAD; TMH, ISBN-10: 0070648379 Year 2007
11. Narayana K.L.; Engineering Drawing; Scitech Publications (India) ISBN-10: 8183714226 Year 2013

Course	Communicative English and Hindi	Marking Scheme			Credits
		T	P	I	
1BTech(PP)5		40	-	10	3 (AEC1)

Unit 1: Language Skills and Presentation

Speaking Skills and Presentation: Presentation Design and Delivery, Monologue Dialogue, Group Discussion, Effective Communication/ Mis-Communication, Interview, Public Speech, Effective Writing, Report Writing, Resume, Circular, Notice and letter Writing

Unit 2: Reading and Understanding

Importance of English as a vehicle of Spoken and written Communication, Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Introduction to Articles of eminent Indian authors, Short Stories of eminent Indian authors

Unit 3: हिन्दी भाषा का परिचय

भाषा की विकास यात्रा, हिन्दी भाषा की संवैधानिक स्थितिः समस्याएँ और समाधान, भाषाः विभिन्न बोलियाँ व स्वरूप, भाषा परिवार और भारतीय भाषाएँ, वर्तमान संदर्भो में हिन्दी की उपादेयता

Unit 4: भाषा

शब्दों की संस्कृति एवं उनका इतिहास, भाषा एवं संस्कृति, भाषा एवं समाज, हिंदी में शब्द संरचना एवं उसके प्रयोगों की विशेषताएं, संधि, समास, उपसर्ग, प्रत्यय, पर्यायवाची, विलोमार्थी, अनेकार्थक, समूहार्थक शब्द (व्यावहारिक, व्याकरण केवल परिचयात्मक), वाक्य, रचना एवं प्रकार, वाक्य रचना के कारक, वाक्य रचना की सामान्य विधियां

Unit 5: Translation / अनुवाद

अनुवाद का अर्थ और परिभाषा, अनुवाद के प्रकार, अनुवाद के उपकरण एवं समस्या, भाव तथा प्रभाव के आधार पर अनुवाद एवं लेख, अनुवाद Hindi to English and English to Hindi

Suggested Readings:

1. Pathway to Greatness : APJ Abdul kalam
2. Wise and Otherwise : Sudha Murthy
3. The Serpents Revenue : Sudha Murthy
4. World Myths and Legends : Anita Nair
5. The Mother I Never Knew : Sudha Murthy
6. The Jungle Book : R Kippling
7. Malgudi Days : R K Narayana
8. The Adventure of Rusty : Ruskin Bond (Collected Stories)
9. अनुवाद विकास एवं संप्रेषण : डॉ. हरिमोहन
10. अनुवाद कला सिद्धांत और प्रयोग : डॉ. कैलाश भाटिया
11. व्यावहारिक हिंदी : डॉ. माखेन्द्र पाठक
12. परिष्कृत हिंदी व्याकरण : बदरीनाथ
13. अच्छी हिंदी : रामचंद्र वर्मा
14. प्रेम चन्द्र एवं जयशंकर प्रसाद की कहानियॉ

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	
BTech(PP)6		40	-	10	3

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION(PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Engineering Physics	Marking Scheme			Credits
		T	P	I	
2BTech(PP)1		50	30	20	6 (CCC5)

Objective: To understand the basic concept of applied Physics.

Unit I: Quantum Physics

Group and particle velocities & their relationship. Uncertainty principle with elementary proof and applications, determinatio.. of position of a particle by a microscope, non existence of electron in nucleus, diffraction of an electron beam by a single slit Compton scattering. Wave function and its properties, energy and momentum operators, time dependent and time independent Schrödinger wave equation. Application of time independent Schrödinger wave equation to particle trapped in . one dimensional square potential well (derivation of energy eigenvalues and wave function)

Unit II: Wave Optics

Interference: Fresnel's Biprism, Interference in thin films (due to reflected and transmitted light), interference from a wedg shaped thin film, Newton's rings and Michelson's interferometer experiments and their applications. Diffraction at single slit. double slit and n-slits (diffraction grating). Resolving power of grating and prism. Concept of polarized light, Brewster's laws, Double refraction, Nicol prism, quarter & half wave plate.

Unit III: Nuclear Physics

Nuclear liquid drop model (semi empirical mass formula), nuclear shell model, Linear Particle accelerators: Cyclotron, genera. description of Synchrotron, Synchrocyclotron, and Betatron. Geiger- Muller Counter, Motion of charged particles in crosse electric and magnetic fields. Uses of Bainbridge and Auston mass Spectrographs.

Unit IV: Solid State Physics

Qualitative discussion of Kronig-Penny model (no derivation), Effective mass, Fermi-Dirac statistical distribution function Fermi level for Intrinsic and Extrinsic Semiconductors, Zener diode, tunnel diode, photodiode, solar-cells, Hall effect.

Superconductivity: Meissner effect, Type I and Type II superconductors, Di-electric polarization, Complex permittivity, dielectric losses

Unit V: Laser and Fibre Optics

Laser: Stimulated and spontaneous processes, Einstein's A & B Coefficients, transition probabilities, active medium, population inversion, pumping, Optical resonators, and characteristics of laser beam. Coherence, directionality and divergence. Principles and working of Ruby, Nd-YAG, He-Ne & Carbon dioxide Lasers with energy level diagram.. Fundamental idea about optical fibre, types of fibres, acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fibre (Ray theory) pulse dispersion, attenuation, losses & various uses. Applications of lasers and optical fibers.

Assignments/Practical Work:

1. Biprism, Newton's Rings, Michelsons Interferometer.
2. Resolving Powers –Telescope, Microscope, and Grating.
3. To study G.M. Counter
4. Spectrometers-R.I., Wavelength, using prism and grating
5. Optical polarization based experiments: Brewster's angle, polarimeter etc.
6. Measurements by LASER-Directionality, Numerical aperture, Distance etc.
7. Uses of Potentiometers and Bridges (Electrical)..
8. Experiments connected with diodes and transistor.
9. Measurement of energy band gap of semiconductor.
10. To study Hall Effect.
11. To study Solar cell.
12. To find the width of s single slit by f He-Ne Laser.
13. To determine the numeral aperture (NA) of an Optical Fibre.
14. To determine plank's constant.

Text & Reference books:

1. Optics by Ghatak, TMH VI Edition ISBN-10: 9339220900 Year 2016

2. Engineering Physics- V Rajendran, TMH I Edition ISBN-10: 0071070141 Year 2010
3. A Text Book of Optics by Subrahmaniyam N & et al. S Chand Publication XXIII Edition ISBN-10: 8121926114 Year 2006
4. A Textbook of Engineering Physics by M.N. Avadhanulu S. Chand Publication Year 2010
5. Atomic and Nuclear Physics by N Subrahmaniyam & et al S Chand & Company Publication ISBN-10: 8121904145 Year 2007
6. Concepts of Modern Physics- A Besier & et al, TMH VII Edition ISBN-10: 9351341852 Year 2015
7. Introduction to Solid State Physics by C Kittel, Wiley India VIII Edition ISBN-10: 8126535180 Year 2012
8. Fundamentals of Physics-Halliday & et al, Wiley India VI Edition ISBN-10: 047122863X Year 2002

Course	Basic Mechanical Engineering	Marking Scheme			Credits
		T	P	I	6
2BTech(PP)2		50	30	20	(CCC6)

Objective: To understand the basic concept of applied Physics.

Unit I: Materials

Classification of engineering material, composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties; alloy steel and their applications; stress-strain diagram, hooks law and modulus of elasticity. tensile, shear, hardness and fatigue testing of materials.

Unit II: Measurement

Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainly analysis, measurement by vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lath, milling, planning, shaping machine, Introduction to NC/CNC/DNC, FMS, CAD/CAM, CIM and factory of future.

Unit III: Fluids

Fluid Properties and Fluid statics- Density, Specific weight, Specific gravity, viscosity, vapour pressure, compressibility, Pressure at a point, Pascal's law, and pressure variation with temperature, density and attitude., classification of flows-steady & unsteady, , uniform & non uniform, laminar & turbulent, rotational & irrotational flows, Euler's equation, Bernoulli's equation for incompressible fluids, working principle of fluid coupling, pumps, compressors, turbines, positive displacement machines and pneumatic machines.

Unit IV: Thermodynamics

Basic concepts, Zeroth law of thermodynamics, first and second law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, classification and working of boilers, Refrigeration, vapor absorption &

compression cycles, coefficient of performance (COP), refrigerant properties & eco friendly refrigerants.

Unit V: Reciprocating Machines

Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol & diesel IC engines. Air pollution due to I C Engines.

Assignments/Practical Work:

1. To perform tensile testing of standard mild steel specimen.
2. To perform experiments on Bernoulli's theorem.
3. To perform experiment of flow measurements by venturi and orifice meters.
4. To practice linear and angular measurement using, vernier, micrometer, slip gauge, dial gauge and sine- bar.
5. To study of different types of boilers and mountings.
6. To perform experiment on mini-boiler (50 Kg/Hour)
7. To find COP of a refrigeration unit.
8. To study of different IC engines & measurement of B.H.P. using rope/belt dynamometer.
9. To study the analysis of exhaust gases on petrol, diesel & bio-diesel engines.
10. To prepare a cross lap joint or other joints in carpentry shop
11. To prepare a fitting job by filling, sawing, chipping also with drilling hole
12. To weld a job by using any arc or gas welding methods

Text & Reference books:

1. G Narula, K Narula, V Gupta; Material Science; TMH I Edition ISBN-10: 0074517961 Year 2001
2. Agrawal B & CM; Basic Mechanical Engg. Wiley India ISBN-10: 8126518782 Year 2008
3. Nag PK, Tripathi et al; Basic Mechanical Engg; TMH ISBN-10: 0070085633 Year 2016
4. Rajput; Basic Mechanical Engg; Laxmi Publications; IV Edition ISBN-10: 8131803597 Year 2007
5. Sawhney GS; Fundamentals of Mechanical Engg; PHI III Edition ISBN-10: 8120351339 Year 2015
6. Nakra and Chaudhry; Instrumentation, Measurement & Analysis; TMH IV Edition ISBN-10: 9385880624 Year 2016
7. Nag PK; Engineering Thermodynamics; TMH V Edition ISBN-10: 1259062562 Year 2013

8. V Ganesan; Internal Combustion Engines; TMH IV Edition ISBN-10: 1259006190 Year 2012
9. Rao PN; Manufacturing Technology- Vol.1& 2, TMH III Edition ISBN-10: 1259062570 & ISBN-10: 1259029565 Year 2013
10. John KC; Mechanical workshop practice; PHI II Edition ISBN-10: 812034166X Year 2013
11. Hazara Choudhary; Workshop Practices Volume I & II.

Course	Basic Civil Engineering & Engineering Mechanics	Marking Scheme			Credits
		T	P	I	6
2BTech(PP)3		50	30	20	(CCC7)

Objective: To know and understand the basic concept used in the field of civil and mechanics.

Unit I: Building Materials & Construction

Building Materials & Construction - Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Unit II: Surveying & Positioning

Introduction to surveying Instruments – levels, thedolites, plane tables and related devices. Electronic surveying instrument etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods measurement of elevations by different methods. Reciprocal leveling.

Unit III: Mapping & Sensing

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.

Unit IV: Forces and Equilibrium

Graphical and Analytical Treatment of Concurrent and non concurrent Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections Frictional force in equilibrium problems

Unit V: Centre of Gravity and moment of Inertia

Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple

Assignments/Practical Work:

Students are expected to perform minimum ten experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

1. To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch's rule.
2. To perform leveling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test orcompaction factor test.
6. To determine the Compressive Strength of brick.
7. To determine particle size distribution and fineness modulus of course and fine Aggregate.
8. To verify the law of Triangle of forces and Lami's theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces
11. To find the support reactions of a given truss and verify analytically.
12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
13. To determine the moment of inertia of fly wheel by falling weight method.
14. To verify bending moment at a given section of a simply supported beam.

Text & Reference books:

1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub. ISBN-10: 8187433930 Year 2009
2. Prasad I.B., Applied Mechanics, Khanna Publication. ISBN-10: 8174090681 Year 2002

3. Punmia, B.C., Surveying, Standard book depot. Laxmi Publications; XVII edition ISBN-10: 8170088534 Year 2016
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI II Edition ISBN-10: 8120344391 Year 2012
5. S.P,Timoshenko, Mechanics of structure, East West press Pvt.Ltd.
6. Surveying by Duggal – Tata McGraw Hill IV Edition. ISBN-10: 1259028992 Year 2013
7. Building Construction by S.C. Rangwala- Charotar publications House, Anand. ISBN-10: 9385039040 Year 2015
8. Bhawan Nirman Samagari by Grucharan Singh- Standard Book House, New Delhi XIV Edition ISBN-10: 8180141608 Year 2012
9. Global Positioning System - Gopi, TMH ISBN-10: 0070585997 Year 2005
10. A. P Boresi & R J Schmidt- Engineering Mechanics- statics and dynamics, Cengage Learning India Pvt Ltd; I Edition ISBN-10: 8131507955 Year 2008

Course	Basic Computer Engineering	Marking Scheme			Credits
		T	P	I	6
2BTech(PP)4		50	30	20	(CCC8)

Objective: To understand the basics of computer science.

Unit I: Computer

Classification, Organization i.e. CPU, Motherboard, register, Bus architecture, Instruction set, Memory & Storage Systems, Input Devices- Scanners, Output Devices- Printers, System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

Unit II: Operating System

Definition, Function, Types, Management of File, Process & Memory. Programming Languages: Generations, Characteristics & Categorization. Introduction to Programming: Procedure Oriented Programming VS object oriented programming, Introduction to Windows and Mac Operating Systems.

Unit III: Introduction to MS Office MS Word

Features & area of use, Menus, Toolbars & Buttons, Creating a New Document, Different Page Views and layouts, Text Formatting, Paragraph and Page Formatting; Bullets, Numbering, Printing & various print options, Spell Check, Thesaurus, Find & Replace, Auto texts, Working with Columns, Creation & Working with Tables, Mail Merge

Unit IV: Concepts of Workbook & Worksheets

Using different features with Data, Cell and Texts, Inserting, Removing & Resizing of Columns & Rows, Use of Formulas, Calculations & Functions, Working with Different Chart Types. Introduction, Creating a New Presentation, Working with Presentation, Using Wizards, Slides & its different views, Inserting, Deleting and Copying of Slides, Working with Notes,

Handouts, Columns & Lists, Adding Graphics, Sounds and Movies to a Slide, , print options.

Unit V: Computer Networking

Types of Network, Topology, Network Devices- , Bridges, HUB, Routers, Repeater and Gateways, Internet, World Wide Web, Concept of Website and WebPages, Search Engines, Portals, Browsers, Network Security & E-commerce.

Assignments/Practical Work:

1. Presentation of Comparison of different Computers, Memory & Devices.
2. Study and Practice of MS windows – Folder related operations, My-Computer, window explorer, Control Panel.
3. Study and practice of Mac Operating System.
4. Creation and editing of Text files using MS- word.
5. Creation and operating of spreadsheet using MS-Excel.
6. Creation and editing power-point slides using MS- power point.
7. Comparison of different Browsers and Search Engines.
8. Comparison of different Websites and Portals.

Text & Reference books:

1. Fundamentals of Computers: E Balagurusamy, TMH, ISBN- 10: 0070141606, 2009
2. Fundamentals of Computers: V Rajaraman, PHI, ISBN-10: 8120350677, 6th Revised edition (2014)
3. Computer Fundamentals: Anita Goel, Pearson, ISBN-10: 8131733092 First edition (2010)
4. Operating Systems – Silberschatz and Galvin - Wiley India, ISBN-10: 8126554274, 2015
5. MS Office- S. S. Shrivastava, Laxmi Publication, ISBN-10: 8131802906, 2015
6. MS Office- S. Jain, BPB, ISBN-10: 8183334024, 2010
7. Windows 7 in simple steps- Dreamtech Press, ISBN-10: 9350040522, 2010
8. Mac OS- Jonathan Levin, Wiley, ISBN-10: 8126540427, 2013
9. Computer Networks:Andrew Tananbaum, ISBN-10: 9332518742 Pearson (2013)
10. Information Technology Principles and Application: Ajoy Kumar Ray & Tinku Acharya PHI, ISBN-10: 8120321847, 2004

Course	Environmental Studies	Marking Scheme			Credits
		T	P	I	3
2BTech(PP)5		40	-	10	(AEC2)

UNIT-1: The Multidisciplinary nature of environmental studies and Natural resources

Definition; Scope and importance, Need for public awareness. Natural resources and associated problems. Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-2: Ecosystems, Biodiversity and its Conservation

Concept, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity introduction-Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

01/09/2017

UNIT-3: Environmental Pollution

Definitions. Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-4: Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation, Consumerism and waste products. Environment Protection Act- Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act.- Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

UNIT-5:

Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare. Role of information Technology in Environment an human health, Case Studies.

Field Work (Practical) 6 hrs = 3Lectures

1. Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain.
2. Visit to a local polluted site- Urban/Rural/Industrial/Agricultural.
3. Study of common plants, insects, birds.
4. Study of simple ecosystems-pond, river, hill slopes, etc.

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Basics of Printing Processes	Marking Scheme			Credits
		T	P	I	6
3BTech(PP)1		50	30	20	(CCC9)

Objective: Understand the flow of printing, raw material required for printing.

Unit I: Brief introduction on history of Printing

Sequential developments in Printing, Printing in India, Recent trends in printing and participation at international level.

Unit II: Introduction to printing process with its principle

Traditional printing processes, letterpress, lithography, flexography, gravure, screen printing and digital printing. Identification of image area and non image area in all printing process; Basics operation in printing: Prepress, press and post press operations; Identification of different printed products- Job suitability of various printing processes. Advantages and disadvantages of various printing processes.

Unit III: Letterpress and Lithographic printing Process

Principle of letterpress, characteristics of letterpress printing, tools & equipments used in the Letterpress department, classification of letterpress printing machines, Inks & image carriers; Lithographic offset printing process: Principle, characteristics of lithographic printing, classification of offset printing machines Different units of offset machine; Sheet fed & Web fed units: Feeding, Inking, Dampening, Printing and Delivery unit.

Unit IV: Flexography and Gravure printing process

Principle, characteristics of flexography, components of flexo press, flexo plates, introduction to flexo inks & substrates ;Gravure printing process- Introduction, characteristics of gravure, principles of gravure printing, basic components of gravure press, gravure inks & substrate.

Unit V: Screen and Digital printing process

Stencils- Their kinds and method of preparation, application of screen printing, screen preparation, printing process steps; Digital printing Process: Introduction, various digital printing technologies.

Assignments/Practical Work:

1. Identification of different tools & equipments used in various printing process.
2. Introduction of different printing presses.
3. Schematic diagram of different printing processes.
4. Study of running & printing faults on different printing process machine.
5. Study of various types of Image carriers for different printing process.
6. Screen Printing- Screen making materials & chemicals. Registration methods.

Text & Reference books:

1. Introduction to Printing-Herbert Simonn Publisher: Faber & Faber (March 17, 1980) ISBN-10: 0571115284
2. Printing Technology - Adams, Faux and Rieber Publisher: Delmar Thomson learning; 5th edition (June 12, 2001) ISBN-10: 076682232X
3. Screen Printing Review - Babett Magee Publisher: Graphic Arts Technical Fndtn (June 1985) ISBN-10: 0883620774
4. Silk Screen Printing – R.Krishnamoorthi
5. Screen Printing -B.D Mendhiratta, Arihant Publications
6. Handbook of Print media: Technologies and production methods -Helmnt Kippahan Publisher: Springer; 2001 edition (September 21, 2001) ISBN-10: 3540673261

Course	Elements of Packaging	Marking Scheme			Credits
		T	P	I	
3BTech(PP)2		80	-	20	6 (CCC10)

Objective: To provide Elementary knowledge Packaging techniques.

Unit I: History and evolution of packaging

Basics of Packaging, Introduction, Classification, Functions & roles, Factors influencing design of a Package.

Unit II: Shelf Life and Packaging Cycle

Product-Package Relationship, Product life cycle curve, Elements of package design, types of Packaging- Flexible , Rigid & semi-rigid .

Unit III: Markings on package

Handling marks, routing marks, information marks; Cushioning materials – Functions and properties, Classification- space fillers, resilient cushioning and, non- resilient cushioning materials.

Unit IV: Introduction to Packaging Media and their characteristics

paper, board, foils poly plastics, glass, wood, metals.

Unit V: Introduction to innovative Packaging

Gas packaging – MAP & CAP, Vacuum packaging, shrink packaging, Stretch wrapping, blister packaging, skin packaging, Aerosol packaging container.

Assignments/Practical Work:

1. To study the historical timeline of packaging.
2. To study the various flexible & rigid packages.

3. To study calculation of cushioning for different materials and products.
4. Detail study of various packaging media.
5. Detail study of innovations in packaging.

Text & Reference books:

1. Packaging design and performance – Frank Paine publisher: Springer; 1991 edition (October 31, 1990) ISBN-10: 075140151X
2. Advances in plastic packaging technology – John Briston publisher: Pira International (December 1992) ISBN-10: 0902799967
3. Packaging Technology: Fundamentals, Materials and Processes (Woodhead Publishing in Materials) ISBN-10: 1845696654

Course	Printing Material Science	Marking Scheme			Credits
		T	P	I	6
3BTech(PP)3		80	-	20	(CCC11)

Objective: To create elementary knowledge of basic science used in Printing Industry.

Unit I: pH and Printing:

Definition of pH, Method of determining pH, Importance of pH in Printing & Packaging, pH of paper & ink, Relative Humidity in Printing and Packaging : Humidity – Definition, Relative Humidity Measurement, Control by air conditioning , role and effect of Relative Humidity in Printing & Packaging

Unit II: Photography in Printing

Photographic emulsions and its composition, Exposure – light source, Photographic processing – Developers, Fixers and intensifiers. Light Sensitive Materials in photography. Photographic Cameras and Contact printing. Line photography, Half-tone with contact screen; Introduction to color Measurement and management: Densitometer, Spectrophotometer, Color control strips.

Unit III: Surface Chemistry

Molecular phenomenon in surface tension - Cohesive and adhesive force, Capillary action, Contact angles, Interfacial Tension and Hydrophobic/ Hydrophilic nature of liquids, Water and Ink Interaction, Emulsification, Effect of light and temperature in printing and packaging.

Unit IV: Polymers and Colloids

Monomer, Polymer, Types of Plastics- Thermo-sets & Thermoplastics; Introduction to Natural Polymers, Cellulose Derivatives, Synthetic Polymers, Polythene, Polypropylene, Polyvinyl Plastics; Colloids- Characteristics, proportion, Applications in printing industry.

Unit V: Introduction to Ink ingredients

Composition of ink- Pigments, vehicles, resins, solvent, plasticizers, driers and additives. Characteristics of each constituent; Rheological properties of inks: viscosity, yield value, thixotropy, flow, tack, body length.

Assignments/Practical Work:

1. To study and Measure pH of paper.
2. Measurement and management of color according to devices.
3. To study and Calibrate Densitometer.
4. To study the techniques of color mixing and matching.
5. To study and compare various light sources used in printing for exposing.

Text & Reference books:

1. Printing Science: By L C Young, F.Pateman Year 1963, Published by Pitman Publishing
2. Engineering Chemistry by Jain and Jain Year 2004, ISBN-10: 9352161319
3. Covington, A. K.; Bates, R. G.; Durst, R. A. (1985). "Definitions of pH scales, standard reference values, measurement of pH, and related terminology". Pure Appl. Chem. 57 (3): 531–542. doi:10.1351/pac198557030531
4. Perry, R.H. and Green, D.W, Perry's Chemical Engineers' Handbook (7th Edition), McGraw-Hill, ISBN 0-07-049841-5 , Eqr. 12-7
5. Hunt, R. W. (1998). Measuring Colour (3rd edition). England: Fountain Press. ISBN 0-86343-387-1.
6. Hand Book of Polymer & Plastic Technology- Engineers India Research In, 2007.

Course	Mechanics of Machines	Marking Scheme			Credits
		T	P	I	6
3BTech(PP)4.1		50	30	20	(CCE1)

Objective: To study the force and vibration acting on the machine parts and analysis of gear train function.

Unit I: Kinematic of Mechanisms

Mechanisms, Terminology and definitions, kinematic inversions of 4 bar and slider crank chains- kinematic analysis in simple mechanisms, velocity and acceleration polygons, analytical methods, computer approach, cams, classifications, displacement diagrams, layout of plate cam profiles, derivatives of followers motion circular arc and tangent cams.

Unit II: Gears and Mechanism Trains

Spur gears, law of toothed gearing, interchangeable gears, gear tooth action interference undercutting, Non-standard teeth, Gear Trains, Parallel axis gears trains, Epicyclic gear trains, Automotive transmission gear trains.

Unit III: Friction

Sliding and Rolling friction, friction angle friction in threads, Friction clutches, Belt and rope drives, Brakes, Tractive Resistance.

Unit IV: Force Analysis

Applied and Constrained forces, Free body diagrams, Static Equilibrium Conditions, Two, three and four force members, Static force analysis in simple Machine members – Dynamic force Analysis, Inertia Forces and Inertia Torque, D' Alember's Principle, Superposition Principle, Dynamic Force Analysis in simple machine members.

Unit V: Balance and Vibration

Static and dynamic balancing, Balancing of revolving and reciprocating masses, Balancing machines, Free vibrations,

Equations of motion, Natural frequency, Damped Vibration, Bending critical speed of simple shaft, Torsional Vibration, Forced Vibration, Harmonic Forcing, Vibration Isolation.

Assignments/Practical Work:

1. To study all inversions of four bar mechanisms.
2. Study of different gears and gear trains.
3. Study of Friction- affects and remedy.
4. Study of various types of cams and followers and drawing the cam profile.
5. To plot fall and rise of the follower versus angular displacement of cam and vice versa.
6. Study of various first order vibration systems.

Text & Reference books:

1. Shigley, J.E. and Vicker, J.J., "Theory of Machines and mechanism" McGraw Hill,1995
2. Ghosh, A. and Mallick, A.K. "Theory of Mechanisms and Machines", Affiliated East-West Press Pvt. Ltd. New Delhi.
3. Rattern, S.S., "Theory of Machines", Tata McGraw Hills Publishing Company Pvt. Ltd., New Delhi, 1994.

Course	Electrical Machines and Utilization	Marking Scheme			Credits
		T	P	I	6
3BTech(PP)4.2		50	30	20	(CCE2)

Objective: To provide a basic understanding of concepts in electrical so that it can be further implemented to printing and packaging machinery.

Unit I: D.C. Generator

Construction; types, series, shunt, compound E.M.F. equation, Building up of E.M.F. in shunt generator, Significance of residual magnetism, Generation characteristics. D.C. Motor: types, Principles of operation, Significance of back e.m.f., Torque equation. Torque-speed characteristics of series, Shunt and compound motors, speed control of d.c. motors by armature resistance, Flux control and thyristor control method Applications.

Unit II: Single Phase Motors

Types, single phase induction motor Principle of operation of induction-motor, Repulsion motor, A.C. series Motor, Application. Measurement of power in Three phase circuit by three wattmeter method, Two Wattmeter method, Single wattmeter method

Unit III: Three Phase Induction Motor

Basic principle of operation, cause of rotating rotor, slip frequency of rotor current, Relation Between torque and rotor power factor, starting Torque for squirrel cage induction motor, Starting torque for slip ring induction Motor, Condition for maximum torque, Effect of rotor resistance on torque, torque-slip characteristic, Different type of starters.

Unit IV: Electrolytic Processes

Introduction, Electrolyte, ionization, Definition of various terms used in electrolysis, Faraday's laws Of electrolysis, Extraction of metals, Refining of metals, electro deposition, power supply for electrolytic processes.

Unit V: Consideration and selection of electric motor for different industrial drives

Electric Welding -Principle, Resistance welding, Arc welding, Atomic hydrogen, A.C. & D.C. welding, welding transformer,

Electric-heating : Introduction, Resistance heating, Direct resistance.Industrial Electrical Installations

Assignments/Practical Work:

1. To perform Load Test on DC Shunt Motor
2. To perform Swinburne's Test
3. To perform Load Test on DC Series Motor
4. To perform Load Test on Three Phase Alternator
5. To perform Load test on Single Phase Transformer.
6. To perform Load Test on Single Phase Induction Motor.

Text & Reference books:

1. Elements of Electrical Engg. - L. Theraja, Vol. 1, 2 publisher: S Chand; 23rd Revised edition (1 June 2006) ISBN-10: 8121924375
2. Elements of Electrical Engineering – 30 Dec 2013 by Maria LM Publisher: Prentice Hall India Learning Private Limited; Fifth edition ISBN-10: 8120348524
3. Electric Motor Drives: Modeling, Analysis, and Control Paperback – Import, 15 Feb 2001 By R. Krishnan (Author), ISBN-10: 0130910147.
4. Electrical Machines, Devices and Power Systems Hardcover – Import, 14 Nov 1996 By Theodore Wildi (Author), ISBN-10: 013367889Xn

Course	Graphics Designing	Marking Scheme			Credits
		T	P	I	3
3BTech(PP)5		40	-	10	(SEC1)

Objective: To develop in students, graphics skills for communication of concepts and design of engineering products and expose them to existing national standards related to technical drawings in printing.

Unit I: Introduction to Graphic Design

Definition, Graphic design, Printer's design.

Fundamentals of Design: Point, line, space, mass, size, scale, tone, texture, pattern, color. Principles of design- balance- symmetric and asymmetric, proportion, rhythm, unity, contrast, simplicity, fitness, Color Modes.

Unit II: Typographic Principles

Understanding face of types, parts of type and typeface, types of strokes and serifs, termination;Dimensional Attributes of a type such as X-height, definition of legibility and readability, study of editing and proofreading of text copy. Study of different types of proof reading marks.

Unit III: Brief Introduction of various software used for Graphics Designing

Introduction to Corel draw, Corel draw interface, Window management. Working with shapes, rectangle, Ellipse. Polygon and star, Drawing grids, spirals and perfect shapes.

Unit IV: Page and document setup

Working with rulers, setting the unit measurement Working with Color and fills. Color palette, adding pattern to object, and Texture fill Working With Paragraph Text, Special Text Effects, Object arrangement, special effect to object, interactive distortion tool, contour tool. Using Layers.

Unit V: In Design Introduction

Get started with In Design, Basic tools overview, Working with frames, Working with graphics, Quickly combine images and type in In Design CS6, House style, Good and bad copy, proofing stages, concept of impositions and method of costing off.

Assignments/Practical Work:

1. Designing of Stationary and small sales literature, visiting card. Letterhead, Envelop, Bill form, Receipt, Invitation card, Posters, Title page of a Book, Magazine Cover page.
2. Direct mail.
3. Folders - Single fold & Double fold.
4. Sticker and Labels.
6. Logo designing on computers.
7. Colour mixing and colour matching.
8. Tagging, creating flow able and fix format, epubs

Text & Reference books:

1. The Designer's Handbook -Alistair Campbell Publisher: Little, Brown & Company; 2nd edition (August 5, 1993) ISBN-10: 0316906581
2. Art and Print Production - N.N Sarkar publisher: Oxford University Press; 2 edition (July 10, 2013) ISBN-10: 0198085567
3. CorelDraw X7 in Simple Steps, Kogent Learning Solutions Inc, Dreamtech Press, ISBN-10: 9351194698, 2014
4. CorelDraw X7 Paperback – 2015 Gary David Bouton Publisher: McGraw Hill Education; 11 edition (2015), ISBN-10: 9339222237
5. Adobe InDesign CS6 Digital Classroom Christopher Smith Publisher: Wiley; 1 edition (15 October 2012)
6. Adobe InDesign CS6 Classroom in a Book Paperback – 4 Jun 2012 Adobe Creative Team Publisher: Adobe; Mac Win Pa edition (4 June 2012) ISBN-10: 032182249

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Printing & Packaging Materials	Marking Scheme			Credits
		T	P	I	
4BTech(PP)1		80	-	20	6 (CCC12)

Objective: To understand the science of various printed and packaged media for production.

Unit I: Metals for Plate-making

Physical and Chemical properties of various Metals used for printing surface like Relief, Planography and Intaglio processes with characteristics; Alloys: Classification of Alloys- Ferrous and nonferrous alloys with examples. Introduction to the use of Metals in packaging and their properties (Physical and chemical).

Unit II: Application of Plastic and other Substrate in Printing and Packaging

Polyethylene, Polypropylene, Polyvinyl Chloride (PVC), and Polyethylene tera-phthalate (PET), Polyester, Polystyrene, Cellophane, Metal, Foils, Laminates. Rubber- Blankets, Rollers.

Unit III: Inks for Printing & Packaging

Types of printing Inks and dyes for various substrates – Paste Inks, Liquid Inks, and Water based Inks, special effect inks and digital printing inks. Cushioning materials.

Unit IV: Natural and Animal Materials

Natural- rubber, gum, Arabic, starch based. Animal & fish glue. Adhesives for Printing & Packaging: Adhesion, Types of Adhesive – Natural- Animal Glues, Fish Glues, Casein Adhesives, Starch Based Adhesives, Natural resin Adhesives, Cellulose Adhesives, Rubber Based adhesives.

Unit V: Synthetic, PUR, Hot melt, Inorganic

Synthetic resin adhesives, Inorganic Adhesives, Hot Melt. Miscellaneous Materials : Different types of rubber used in printing,

Book binding Materials – Leather, Cloth, Rexene, Threads, Tapes, Stitching Wire, Covering Materials, Laminates.

Assignments/Practical Work:

1. To understand and study the metal used as image carrier for different process(ex. Letterpress, offset)
2. To understand and study various polymers used as printing and packaging material(ex. L.D.P.E.,H.D.P.E)
3. Comparing adhesives and their use in printing and packaging.
4. To understand the use of Inks as per the job suitability.
5. To study book binding materials.

Text & Reference books:

1. Fundamentals of Packaging Technology-FOURTH EDITION, Walter Soroka, CPP- Publisher: Institute of Packaging Professionals; 4 edition (21 January 2010)- ISBN-10: 1930268289
2. Packaging Technology: Fundamentals, Materials and Processes, Anne Emblem, Henry Emblem- Publisher: Woodhead Publishing (29 October 2012)- ISBN-10: 1845696654
3. Printing Technology (Design Concepts) , J. Michael Adams, Penny Ann Dolin- Publisher: Delmar Cengage Learning; 5th Revised edition edition (12 July 2001)- ISBN-10: 076682232X
4. Lithographers Manual – Jan 1994 y Raymond N. Blair (Author), Thomas M. Destree ISBN-10: 088362169X
5. Chemistry for Graphic Arts- Dr. Nelson R. Eldred.- Publisher: Gatfpress; 3 edition (1 October 2001)- ISBN-10: 0883622491

Course	Imaging Technology	Marking Scheme			Credits
		T	P	I	6
4BTech(PP)2		50	30	20	(CCC13)

Objective: To impart knowledge on text composing, film processing, , image setters, plate setter, printers and plotters.

Unit I: Text Composing

Printer's measurement system. Type series, Family, Typographic Parameters. Copy mark-up, Casting off, Copy editing. Proof reading marks. House style, Text composing techniques: Electrical & electronic typewriters, Word Processors. Early Phototypesetting Systems and Devices, storage of Master fount, Character coding, Digitization, Founts, outline, true type, open type, PS. Types of laser source, modulation and deflection methods-Speed and resolution of laser typesetters.

Unit II: Conventional Originals and Film

Originals for reproduction, Line reproduction, Halftone reproduction, Theories of dot formation. Action of light, Types of films Development theory, variant in development, sensitometry, Transmission densitometer, Lens and lens aberrations.

Unit III: Sources and Handling

Scanner types, Drum, flatbed, Dynamic range, Resolution, Storage, File formats. Digital Camera, Principles, mechanism types, resolution, memory, software. Computer requirements.

Unit IV: Image Setter and Platesetter

Image setters, Types: Capstan, internal, external and virtual drum, light sources, Raster image processors, Screening Technologies. Plate setter, Types of CTP, Photopolymer, Sliver halogen, Thermal, advantages and disadvantages.

Unit V: Printers and Proofers

Non-Impact printing, Inkjet, dye-sub, thermal wax, electro photography, Various types of proofers, Large scale flex plotter.

Assignments/Practical Work:

1. Demonstrate and explain imagesetter and its construction
2. Demonstrate and explain platesetter and its construction
3. Demonstrate and explain non impact printing
4. Demonstrate and explain types of CTP
5. Demonstrate and explain electro-photography

Text & Reference books:

1. Alan Holmes(1984), "Electronic Composition", Emblem Books Ltd.
2. J. Michael Adams, David Faux and Loyds J. Reiber, "Printing Technology", III Edn. Delmer
3. Helmut Kipphan (Ed.)(2001) "Handbook of Print Media"
4. James Craig(1978), "Phototypesetting A Design Manual", Wetson-Gu Publication, New York.
5. Les Health and Ian Faux(1978), "Phototypesetting", SITA Ktd.,
6. "Handbook of Modern Halftone Photography", Perfect Graphic arts, Demarset, U.S.A.
7. Phil Green(1995), "Understanding digital colour", Blueprint.
8. David Bergsland(1997), "Printing in a digital world", Dlmar Publishers.
9. Frank Cost(1997), "Pocket guide to digital Printing", Delmar Publishers.
10. T.E. Schildgen(1998), "Pocket guide to colour with digital application", Delmar Publishers.

Course	Technology of Sheet fed offset Printing	Marking Scheme			Credits
		T	P	I	
4BTech(PP)3		50	30	20	6 (CCC14)

Objective: To understand and execute the technique of sheet fed offset for print production.

Unit I: History of offset printing

Recent trends in offset press technology. Basic principles of sheet fed offset printing. Construction and categories of sheet fed offset press. Safe handling of tools, equipment and materials in offset press.

Unit II: Feeding unit

Functions of the feeding section, sheet feeding types, feeding cycle, components of feeder, sheet conveying mechanisms, sheet detectors, sheet register, front lay and side lay, sheet insertion systems, grippers. Inking unit: role and function of inking system, different parts of inking system, split duct techniques, types of rollers in the inking system, setting of the rollers, care and maintenance of rollers, different inking systems.

Unit III: Dampening system

Role and function of the dampening system, fountain solution, pH and conductivity of the fountain solutions, role of water in fountain solution, role of alcohol or alcohol substitutes in fountain solution, different rollers in the dampening system, roller coverings, and doctor dwell, desensitizing the metal rollers, different dampening systems, care and maintenance of the dampening system.

Unit IV: Printing unit

Different cylinders and their construction, cylinder gears, cylinder gap, bearers, undercut, cylinder packing, patching, printing pressures, cylinder setting theories, cylinder balancing. Pre-make ready and make ready.

Unit V: Delivery section

Role and function of delivery section, transfer cylinder, sheet transfer, sheet delivery, short and extended delivery systems, sheet control devices, anti-set off spray powder unit. Machine production. Trouble shooting. Printing machine maintenance.

Assignments/Practical Work:

1. Study of various controls and operations.
2. Study of various mechanisms.
3. Study of the lubrication system.
4. To perform premake ready operations like setting the feeder, feed board, lays and delivery.
5. Study of setting the water and ink rollers and fixing the plate.
6. To prepare and print a job for Single color printing.
7. To prepare and print a job for Two color printing
8. To prepare and print a job for Four color printing.

Text & Reference books:

1. Printing Technology 3rd Edition- Adams, Fax & Rieder- Publisher: Delmar Cengage Learning; 5th Revised edition (12 July 2001)- ISBN-10: 076682232X
2. Sheet fed offset Press Operating- Lloyd P.Dejidas.
3. Stripping- Harold L.Peck- ISBN-10: 0883621177
4. Selecting the Right Litho Plate- BPIF.
5. Manual of advanced lithography Hardcover – 14 Dec 2016- ISBN-10: 0684149370

Course	Screen Printing	Marking Scheme			Credits
		T	P	I	6
4BTech(PP)4.1		50	30	20	(CCE3)

Objective: To impart knowledge on the basic principles of Screen printing process, stencil preparation methods & types of presses, print problems & quality control in screen and textile printing process.

Unit I: Screen Preparation and Stencil Making

Mesh materials, Characteristics and selection, types of frames, screen Tensioning Devices, screen pre-treatment, Degreasing of a screen, hand cut stencils, photomechanical stencil making, direct & indirect process, Equipment used.

Unit II: Machine Printing

Flatbed hinged frames, vertical lift, cylinder bed, Container Printing & Rotary machines, squeegee: Types and maintenance.

Unit III: Ink and Solvents - Drying Methods

General properties, Basic constituents of screen ink, Major classes of solvents, safety in the handling and storage of ink & solvents. Oxidation drying, solvent Evaporation, Infra- red & Ultraviolet curing.

Unit IV: Textile Printing

Design: Gouache, Bottled water colors, Painting and Blotches, Resist Techniques, Surfaces, Transfer Techniques. Materials, Dyeing, Single stage dyeing and polychromatic dyeing, Synthetic fabrics, blended fiber fabric, natural fabrics, Paper, paints Brushes, Pens and Inks, palettes, Pencils, Adhesives.

Unit V: Practical Session

Direct and indirect Stencil making, Screen producing, Producing single color and multi color images. Producing half tone images, Study of automatic, semi automatic screen printing Machines, Industrial Visit.

Assignments/Practical Work:

1. To perform printing visiting Card, letter head, greeting card etc.
2. To Make Metallic Effect, Flocking.
3. To perform printing on irregular shaped object.
4. To perform printing on non-absorbent surface such as ceramic, glass etc. (special ink curing).
5. To perform screen printing on PCB, keyboard etc.

Text & Reference books:

1. John Stephens(1994), Screen process printing; Blueprint publishing Ltd.,
1. Albert Koslof (1900), Screen printing techniques; the signs of the Times Publishing Co.,
2. Chawan, R.B(1981), "Advances in textile chemical processing Ed.", IIT, Delhi,
3. Joyce Storey, The Thanes & Hudson Manual of Textile Printing, Thames &Hudson Ltd., London, 1984.
4. Mary Paul Yates(1996), Textile, A Handbook for Designers, W.W. Norton & Company, London.
5. Susan Bosence(1985), Handbook Printing & Resist Dyers, David & Charies, London.

Course	Planning for Print Production	Marking Scheme			Credits
		T	P	I	6
4BTech(PP)4.2		50	30	20	(CCE4)

Objective: To understand the Planning of various printed and packaged media for production

Unit I: Classification of Print Products for Commercial Printing and Package

Commercial Printing- Books, magazines, stationary, newspaper, utility(bills, variable data printing(VDP), customized) printing advertising materials like Pam plates ,posters, danglers, calendar, etc ; Package printing:- Folding boxes, cartons, label, flexible packing, tin, wood, glass.

Unit II: Designing of Print Products for Commercial Printing and Package

Design considerations & principle for books & magazines, newspapers stationary & advertising products.
Design considerations including legal aspects & principles for flexible, rigid and label packing.

Unit III: Selection of Printing Processes for different products

Selection criteria for books & magazines - offset, digital, gravure, wed offset, sheet offset, digital. Stationary-screen and offset, advertising products- digital and offset, Selection criteria for flexible, (flexo & gravure), rigid (offset & flexo) and label (offset & flexo) packing.

Unit IV: Selection of Substrates and others materials

For newspaper, books, magazines, Newspaper, books, magazines stationary & advertising products.

Unit V: Selection of Binding, Finishing & Converting Products

Process and study of machines utilized For Books & magazines- Folding, gathering (stitching, sewing & perfect), securing covering (soft cover, hard cover), center stitch & finishing (packaging & shipping);Newspaper- folding, gathering, bundling; Packaging-Rigid, inline die cutting, creasing & embossing, Stitching; Flexible - Filling, scaling/weighing, sealing, making label

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cutting, gluing, die cutting.

Assignments/Practical Work:

1. To identify and study advertising media ex. Flyers, Brochures, Pamphlet.
2. Understanding the paper weights or G.S.M.
3. To understand and identify the various printed material(By Printing Process)
4. To create and print advertising material with various printing process.
5. Understanding the binding process for book, magazines.

Text & Reference books:

1. Fundamentals of Copy & Layout -A.C. Book(Ac)Sohick(Cd)- NTC Publishing Group,U.S.; 3rd edition edition (1 April 1997) ISBN-10: 0844230227
2. Production for the Graphic Designer- Craig- Publisher: Watson-Guptill; 2nd Revised edition edition (1 October 1990)- ISBN-10: 0823044165
3. How to brief designs & buy print- Murray (Ray)- Publisher: Random House Business Books; New edition edition (16 April 1984)- ISBN-10: 0091501911
4. A manual for lithographic press operation / by A. S. Porter Published by London : Litho Training Services Ltd, [1977] ISBN 0906091012

Course	Packaging Design	Marking Scheme			Credits
		T	P	I	3
4BTech(PP)5		40	-	10	(SEC2)

Objective: To understand the aspects of design in packaging

Unit I: Packaging Media

Application, Properties, types, Advantage & disadvantage of paper, paper board, Glass, Metal, Wood & Plastic (BOPP, HDPE LDPE, LLDPE, PVC, PP, PET, Polyolefin, Cellulosic).

Unit II: Carton Production

Folding cartons-its Production steps, types. Corrugated containers-classifications, components in a corrugated board, flutes and stages in preparation in corrugated boards. Plastic corrugated containers - features & advantages

Unit III: Plastic Packaging Techniques/Processes

Injection Blow Moulding, Extrusion blows moulding, Extrusion. Injection Moulding. Compression moulding, Thermo forming-Vacuum forming, Pressure forming, and Matched mould forming.

Unit IV: Packaging Testing and Design

Stages in packaging design or understanding the Packaging design process chart, Computer Aided Package Design; hazards on package –Mechanical, Climatic, Biological and other hazards. Tests on package- Mechanical test- Drop test, Vibration test Compression test, Inclined impact test, Rolling test, Climatic tests- Rain test, Sand and dust test, Salt spray test, Fungus resistance test. Shelf life.

Unit V: Ancillary Packaging concept

Futuristic trends in packaging. Advancements in food packaging. Environmental implications of packaging- recycling, Legal aspects in Packaging. Adhesive tapes- Fabric tapes, Paper tapes, Film tapes, Foil tapes, Foam tapes, two faced tapes. Labels Basic elements of correct labelling, Purpose, Types. Ancillary Materials: Sealing tapes Strapping and stapling, labels and

labelling.

Assignments/Practical Work:

1. Create 2D drawings in CAD software using Different basic shapes
2. Create Graphics Design for Folding cartons
3. Create Graphics Design for Glass containers
4. Create Graphics Design for Plastic containers
5. Create Graphics Design for Bags & Pouches
6. Create Dieline layouts for folding cartons and their multiple ups
7. Develop a 3D package design and draw out the different views in 2D.
8. Design an artwork/graphics for a label.
9. Design an artwork/graphics for a corrugated fibre board box
10. Redesign of different flexible and rigid packages.
11. Test conducted on Cartons, Corrugated packages, wooden packages, Drop test, Vibration test, inclined impact test, Compression test, rolling test, Drum test.

Text & Reference books:

1. Packaging design and performance- Frank Paine- Publisher: Pira International (1 May 1990)- ISBN-10: 0902799274
2. Advances in plastic packaging technology- John Briston- Publisher: Pira International (1 December 1992)- ISBN-10: 0902799967
3. Fundamentals of Packaging Technology-FOURTH EDITION, Walter Soroka, CPP- Publisher: Institute of Packaging Professionals; 4 edition (21 January 2010)- ISBN-10: 1930268289
4. Packaging Technology: Fundamentals, Materials and Processes , Anne Emblem, Henry Emblem- Publisher: Woodhead Publishing (29 October 2012)- ISBN-10: 1845696654
5. Packaging Design Strategy (Pira Packaging Guide) Hardcover – Import, 20 Jun 1994 Bill Stewart Publisher: CRC Press (20 June 1994) ISBN-10: 1858020646

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Technology of Flexography	Marking Scheme			Credits
		T	P	I	
5BTech(PP)1		50	30	20	6 (CCC15)

Objective: It covers information regarding flexographic image carrier, detailed process, technical advancements and its limitation. This course will be particularly useful for students seeking a future in packaging fields as well as Label Industry.

Unit I: Introduction to Flexography

The evolution of flexography, Definition Scope & Principle of flexographic printing, Advantages of flexography, Press development. : Narrow web presses-Narrow web press components, Future narrow web flexography. Wide web presses. Corrugated presses. Pre printed liner presses. Mechanics/Main components of flexography - Fountain roll, Anilox roll, Doctor blade, plate cylinder, impression cylinder. Flexographic printing plates: Introduction, Rubber plates, Photopolymer plates its kind, method, preparation, care handling and storage.

Unit II: Pre-Press

image capture, preflight quality control, job assembly/layout, film output/image setting, proofing, back-end quality control process color:- color theory, color measurement, achieving optimum press performance

Unit III: Press

Mounting and Proofing: Introduction, Checking the equipment. Operation and care of equipment. Understanding the mounting instructions. Tools for the operator. Basic requirements for process colour printing. Press room practices. Environment and safety concerns.

Unit IV: Flexography and Bar-coding

Barcode structures. Types. Verifying/Analyzing printed barcodes.
UPC and flexographic printing. UDC film masters and printing capability tests. The shipping container symbol (SCS). SCS

shipping contain Barcode printing. Beyond the Horizon- Future of Flexography Future of Ink distribution system. Future of flexographic plates. News print for water-base flexography.

Unit V: Inks

Ink Formulation, Selecting ink with respect to End Use Requirement,
Substrate used for flexography printing: Paper and Paperboard, Corrugated Board, Laminates, Foils, Films. Future of flexography.

Assignments/Practical Work:

1. Introduction and familiarizing flexo machine and other related elements.
2. Preparation of rubber plates.
3. Study and Preparation of liquid & sheet polymer plates.
4. Registering and plate mounting on flexo plate cylinder.
5. Study of make ready procedures for a flexo machine.
6. Printing single color, two colors, and four color.
7. Studying of 6 color and 8 color flexo machines.
8. Printing on various substrates LDPE, HPDE, Paper, Aluminum foil.
9. Identification of flexography printed product.

Text & Reference books:

1. Foundation of flexography technical association Publisher: Foundation of Flexographic Technical Association (4 January 2014) ASIN: B00DD5TT0Q
2. Handbook On Printing Technology (Offset, Gravure, Flexo, Screen) Publisher: Asia Pacific Business Press Inc.; 2nd edition edition ISBN-10: 8178330873 ISBN-13: 978-81783308

Course	Image Carrier for Printing Process	Marking Scheme			Credits
		T	P	I	
5BTech(PP)2		50	30	20	6 (CCC16)

Objective: In the developing era of technology in printing field, it has become necessary to possess the advance knowledge of various Image Carriers for various Printing processes. The purpose of this course is to enhance the knowledge and skill about various Image Carriers and advancements in technology.

Unit I: Introduction to Film Image elements and image Assembly of films

Diffusion Transfer Materials, Assembly and masking. Basic Steps in Planning a Film and plate Image Assembly. Image assembly for single color printing and multi color printing-Imposition consideration.

Unit II: Sources for Image Generation

Introduction to tools & equipments used in Preparation of Image carrier for Major printing Processes. Introduction to light sources for Plate-making department for various printing processes,

Unit III: Image carrier for Offset

Introduction, Types of Plates – Conventional Plates, New Era Plates, Basic steps in preparation of Conventional Plates – Surface Plates and Deep Etch Plates, General processing Sequence for a Positive and Negative Working Plates, General processing Sequence for a New Era Plates – Diazo Plates, PS, Photo polymer, Photo Cross Linking Plates, CTP Plates . Working with CTP Plates, Introduction of Multi-metal plates, Paper/ Film Based Plates. Image generation for Offset DI Presses. Image Carrier for Gravure Technology.

Unit IV: Image Carrier for Flexography – Introduction, Types of Flexography Plates – Rubber and Solid Photo Polymer Plates, Liquid Photo Polymer Plates, their Advantage and Limitations, Base materials for Photopolymer Plates. Plate making process for Rubber Plates, Liquid Photo Polymer Plates, Solid Photo Polymer Plates. Computer to Plate Technology.

Unit V: Image Carrier for Auxiliary and Screen printing Processes

Driography, Dry-offset, Toray Waterless Plates, and Silicon Plates for Dry offset Printing / Water Less Printing, Image carrier for Screen printing.
Quality Control in Image Carrier Department: Introduction to Quality Control Aids, tools and Equipments.

Assignments/Practical Work:

1. Preparation of Half tone negative using process camera.
2. Preparation of own colour control patches.
3. Preparation of Gray Scale.
4. Study of spectrophotometer curve.
5. Working of Image Setter and obtaining output on Image Setter.
6. Study of Colour Correction methods and its need.
7. Study of Software for colour separation.
8. Study of UCR and GCR and its applications.
9. Comparison of manual Separation and electronic separations.
10. Preparations of fake colour separation
11. Preparations manual colour separation

Text & Reference books:

1. Dr. R.W.G. Hont :- The reproduction of colour. Fountain Press, 4th edition, Publisher, Fountain Press Ltd, 2004, ISBN, 0863433685, 9780863433689
2. Gravure: Process and Technology Publisher Gravure Association ofAmerica1991,ISBN18802900069,781880280002
3. Handbook of Printing Processes , Deborah L Stevenson Charles Lucas Publisher: Graphic Arts Center Publishing Company (December 12, 2011)ISBN-10: 0883621649 ISBN-13: 978-088362164
4. Colour Separations Technique Miles South worth PUB- Graphic ART ISBN-10-0933600003,ISBN13- 9780933600003

Course	Paper Based Packaging	Marking Scheme			Credits
		T	P	I	6
5BTech(PP)3		80	-	20	(CCC17)

Objective: Paper and Paper board packaging know about physical and chemical Properties Pulping types. Learn basic analysis technique of paper and paper board. Examine various significant Properties of paper and paper Board for specific application.

Unit I: Paper and Paperboard

Paper composition-Fiber, fiber length, Manufacturing process, Paper and board Coating, Appearance properties: Colour, Surface smoothness, surface structure, gloss, opacity, printability and varnish ability, Surface strength, Ink and varnish absorption and drying.

Unit II: Paper Properties and Measurements

Printability, blister resistance, compressibility, Dimensional stability, Formation, Porosity, Smoothness, Surface strength, Ink absorbency, Paper pH, Moisture, water resistance, water absorption. Optical Properties – Colour, Gloss, Mechanical Properties – Bursting strength, Tear, Stiffness, Tensile strength, Dimensional stability and Grain direction.

Unit III: Paper Board &Types Measurements :Paperboard Folding box board, white lined chipboard, solid bleached board, solid unbleached board, Liquid packaging board, Container boards, Specialty boards, Rub resistance;. Performance Properties: Weight, Thickness, Moisture Content, Tensile strength, Stretch or elongation, Tear Strength, Burst strength, Stiffness, Compression strength, Crush strength, Creasability and fold ability, Ply bond strength, Flatness and dimensional stability, Porosity, Water absorbency, Gullibility/Sealing, Taint and odor neutrality.

Unit IV: Conversion Process

Flexible packaging manufacturing; Paper bags types, manufacture, Composite cans manufacturing, applications; Fibre drums. Multiwall paper sacks - types, manufacture; Rigid boxes, Folding Cartons Design, Manufacturing; Solid fibreboard packaging,

Paperboard based liquid packaging, Molded pulp containers.

Unit V: Corrugated Board

Corrugated Board construction - Flutes/Single, Double, Triple Wall, Board grades, Manufacture, Adhesive Bond, Specifications, Flat Crush/Edge Crush Tests Box Certificates. Box Layout, Types, Manufacture/Scoring Allowances, Optimization, Economy. Compression Test, McKee Formula/ECT, Inserts/Partitions, Stack Height, Pallet Patterns, Banding/Strapping/Taping, Corrugated Board Pallets, Corrugated Board Cushions.

Assignments/Practical Work:

1. Introduction of paper & paper board Manufacturing.
2. Testing methods of Paper & paper board.
3. Study of Paper Properties and their measurement.
4. Study of different type Of paper & paper board conversion.
5. To study flutes features of corrugated board.

Text & Reference books:

1. Handbook of Paper and Paperboard Packaging Technology , Mark J. Kirwan Publisher: Wiley-Blackwell; 2nd Revised edition (11 January 2013) ISBN-10: 0470670665 ISBN-13: 978-0470670668
2. Pulp & paper Industry Pratima Bajpai ISBN-978-0-12-803411-8 (2016)
3. Fundamentals of Packaging Technology-Fourth Edition Perfect Paperback – Import, 21 Jan 2010 by Walter Soroka (Author) Publisher: Institute of Packaging Professionals; 4 edition (21 January 2010) ISBN-10: 1930268289

Course	Packaging Material Science	Marking Scheme			Credits
		T	P	I	6
5BTech(PP)4.1		50	30	20	(CCE5)

Objective: In the era of packaging knowledge of various packaging techniques is necessary. Packaging is becoming one of the large segments of printing and related industry. This course intends to deal with additional knowledge of packaging requirements such as variety of substrates, finishing operations, its conversion etc.

Unit I: Introduction to Packaging science

Function of Packaging-Containment, Protection, Preservation, Need and requirement of good packaging, Selection criteria for packaging material, Types of packaging: primary, secondary, tertiary etc. Principal instrumental techniques employed for packaging controls.

Unit II: Polymers as Packaging Material and Drying methods

Introduction to classification of Polymers, properties and uses of standard and specialty polymers used in packaging; Bio degradable polymers and additives for packaging materials, Additional and Conditional polymers; various Drying methods of printing Inks - (i) Oxidation (ii) Evaporation (iii) Absorption (iv) Precipitation (v) IR /UV drying / Heat set

Unit -III: Packaging Of Food Product Packaging

Humidity - Relative humidity, measurement, control by air conditioning; Role of Food Packaging- Protection/preservation, Functions, Shelf-life - significance, classification, food spoilage and control measures, Testing methods- Barrier Testing, Decomposition of Package and product.

Unit IV: luminous flux

luminous intensity, illumination power, intensity of illumination of a surface, brightness or luminance of a surface, laws of illumination - inverse square law and lambert's cosine law, types of photometers, photovoltaic photometer.

Unit V: Q.C Test for package

Optical Testing: Gloss, Haze, See through. Machinability Test- Dimensional stability, slip, curl, running quality. Mechanica Test: Burst Impact, Tensile, Elongation, tear etc. Package Test: Compatibility, Product loss, taste and odor, leakage, stress crack resistance, drop test, vibration test, stack load test, storage test.

Assignments/Practical Work:

1. To study process of Electroplating
2. To study classification of polymer
3. Detail study of Packaging of Food Product Packaging (FPP)
4. To study luminous flux.
5. To study of Quality Control Test for package such as burst test, WVTR etc

Text & Reference books:

1. Fundamentals of Packaging Technology-Fourth Edition Perfect Paperback – Import, 21 Jan 2010 by Walter Soroka (Author) Publisher: Institute of Packaging Professionals; 4 edition ISBN-10: 1930268289, ISBN-13: 978-1930268289
2. Polymers for Packaging Applications Hardcover – Import, 9 Sep 2014by Sajid Alavi (Editor), Sabu Thomas (Editor), K. P. Sandeep (Editor), Nandakumar Kalarikkal (Editor) Publisher: Apple Academic Press ISBN-10: 1926895770 ISBN-13: 978 1926895772
3. Handbook of biodegradable polymers. Bastioli C. 2005 Toronto-Scarborough,Ontario, Canada: ChemTec Publishing. 53ɔ p.
4. Plastics in food packaging. In: Coles R,McDowell D, KirwanMJ,editors 2003 .Food packagingtechnology.London,U.K.:BlackwellPublishing, CRC Press. p 174–240.
5. Paper and paperboard packaging. In: Coles R, McDowell D, Kirwan MJ, editors 2003. Food packaging technology. London. U.K.: Blackwell Publishing, CRC Press. p241–81

Course	Microprocessor and Microcontroller	Marking Scheme			Credits
		T	P	I	6
5BTech(PP)4.2		50	30	20	(CCE6)

Objective: To introduce microcontroller based systems and their operation so as to appreciate the control logics present in printing machines.

Unit I: Introduction

Introduction to embedded systems, Embedded processor families, Microprocessor v/s microcontroller, A micro controller survey, development systems and Microcontrollers, Application of Microcontroller and microprocessor in Printing Industry. **8086 Microprocessor:** Architecture, Addressing modes, Instruction set and assembly language programming, Assembler and advanced programming. Signals, minimum and maximum modes of operation.

Unit II: The 8051 Architecture

Introduction, 8051 Microcontroller hardware, input / output pins, ports and circuits External memory, counters and timers, serial data input /output. **Data transfer Instructions:** Addressing modes, External data moves, push and pop op codes, data exchanges and example programs.

Unit III: Arithmetic and Logic Instructions

Unsigned addition and subtraction, multiplication and division. Compare, rotate and swap instructions and example programs. **8051 timers, counters and Serial communication:** 8051 timers, counter programming, Basics of serial communication, 8051 connection to RS 232, serial communication programming.

Unit IV: 8051 Interfacing

Programming 8255 in I/O mode, Interfacing DAC, Seven Segment display, Logic Controller and other devices.

Unit V: Programmable Peripherals and Memory Interfacing

Programmable DMA controller, 8251 USART, 8259 Interrupt controller, memory interfacing

Assignments/Practical Work:

1. Introduction to 8051 simulation software and familiarization of 8051 instruction set
2. Introduction and programming using 8051 trainer kit
3. Introduction to 8086 Programming
4. Arithmetic and logic operations related programs
5. Array handling and codes conversion programs
6. Signed and unsigned arithmetic
7. Programming using 8051 trainer kit in serial mode
8. Simple Interfacing programs using DAC, Seven segment display and Stepper motor
9. Arithmetic and Screen display programs

Text & Reference books:

1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd edition, Pearson Education India, 2008
2. Kenneth J.Alaya, "The 8051 Microcontroller", Thomson Delmar Learning, 3rd Edition, 2005.
3. I.ScottMacKenzie and Raphael C.W.Phan, "The 8051 Microcontroller", 4th edition, 2006, ebook.
4. Douglas V.Hall, " Microprocessors and Interfacing " Tata McGraw Hill International, Delhi, revised 2nd ed.,2005
5. Sunil K. Mathur "Microprocessor 8086: Architecture, Programming AndInterfacing", Prentice Hall of India, 2010

Course	Digital Pre Press	Marking Scheme			Credits
		T	P	I	3
5BTech(PP)5		40	-	10	(SEC3)

Objective: Digital Imaging systems or Image carrier generation techniques are one of the most controlling factors for print quality and print production. The conventional techniques are get superior by advancement in Electronic and Mechanical technology.

Unit I: Digital Imaging

Definition, applications and factors that accelerated the development of Digital Imaging in graphic prepress technologies. Comparison of conventional film, plate making and digital imaging approaches used in graphic reproduction. Advantages of Digital Imaging prepress techniques.

Unit II: Electronic input devices

OCR, Scanner, Digital Back, Digital camera, Digital pen. Its principles, types, components. Types of scanning advanced scanning techniques and input methods.

Unit III: Impositions techniques

Half sheet, sheet work; electro photography imaging, Study of working principle, spectral sensitivity, and stages involved in electro photography - advantages, applications and limitations of electro photography.

Unit IV: Auto processor

Technological Transformation from Computer to film (CTF). Computer to plate (CTP): components, principles, features and recent advancements.

Unit V: CTM

Components, principles, features and recent advancements and study of different Computer to machine (CTM). Different types of Lasers used in printing industry. CIP3,CIP4

Assignments/Practical Work:

1. To study image manipulation techniques.
2. To study components and working of CTP.
3. To study components and working of CTM.
4. Study of advantages and features of Advanced CTM.
5. Study of imposition techniques (s/w)
6. Study of online & offline models.

Text & Reference books:

1. Pocket Guide to Digital Prepress Paperback – June 29, 1995by Frank Romano (Author) Publisher: Cengage Learning; 1 edition ISBN-10: 0827371985 ISBN-13: 978-0827371989
2. Getting it Right in Print: Digital Prepress for Graphic Designers by Mark Gatter (Author) ISBN-13: 978-0810992061ISBN-10: 081099206X
3. Professional Prepress, Printing, and Publishing 1st Editionby Frank Romano (Author) Publisher: Prentice Hall; 1 edition (March 4, 1999) ISBN-10: 0130997447ISBN-13: 978-0130997449

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	
BTech(PP)6		40	-	10	3

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Technology of Gravure	Marking Scheme			Credits
		T	P	I	6
6BTech(PP)1		50	30	20	(CCC18)

Objective: History & Introduction and scope of Gravure presses and press work, Gravure printing process & Gravure Machine Designs.

Unit I: History & Introduction

History and scope of Gravure presses and press work, Gravure printing process & Gravure Machine Designs.

Unit II: Image Carrier Preparation & Image Generation

Gravure screens, Cylinder construction & Preparation - Thin layer method, Thick Layer method, Ballard Shell Treatment Cylinder Design & its types, Gravure cylinder preparation, Sleeve & Solid cylinders, Considerations for Gravure Cylinder preparation.

Unit III: Methods of Gravure cylinder preparation

Diffusion-etch method, Direct transfer, Electro-mechanical process, Laser cutting, Cell configuration, advantages & disadvantages, Cylinder correction method. Well formation and structure- Variables, Basic types, balancing the cylinde copper plating & polishing, Reuse of cylinders. Sleeve & integral shafting of cylinders. Cylinder Imbalance- static & dynamic.

Unit IV: Doctor Blade & Impression Roller Mechanism

Doctor Blade Materials, Doctor Blade assembly, Blade angles, Blade distance from nip, blade edge, blade mounting. Docto blade holder configurations, Preparing blade for use doctor blade problems. Doctor blade wear - Fatigue, corrosion, abrasive, adhesive wear. Gravure Impression Roller- Function of Impression Roller, Roller covering, Roller pressure, Balance- static dynamic. Gravure roller coating. Handling & Storage of impression roller. Impression roller problems. Impressio mechanisms- mechanical, hydraulic, pneumatic. New developments. Drying system in Gravure: Gravure Ink dryers - Need for

ink dryer, Dryers Functioning, Dryer Limitations, Heat sources- steam, Electric and Gas, Combination gas/Oil. Thermic oil, reuse of Waste heat from incinerators.

Unit V: Gravure substrates and their Calculations

Publication Paper substrates, Packaging Paper Substrates, Non paper substrates Metalized Films & Foils. Inks & Additives for Gravure and their Calculations: Gravure Inks – Constituents of Gravure Ink, Dilution of Printing Ink, Types of Gravure Ink Water based, Solvent based. Polyurethane based, Vinyl based, Dye based. Diff. Kind of additives used for respective inks, other additives, Solvent Recovery System - Solvent Recovery System and their advantage in Gravure Printing Ink. Recent Trends and Future of Gravure: Future of Gravure printing & Packaging Industry, Future of Gravure Publication industry. Recent Trends and new developments in Gravure Industry.

Assignments/Practical Work:

1. Study of Various Gravure Printing Machine Configurations.
2. Study of Various components of a Gravure Printing Machine.
3. Study of Cylinder Preparation Methods.
4. Pre-make and Make Ready in Gravure printing process.
5. Study of Feeding Unit of Gravure printing process.
6. Cylinder setting in Gravure Printing Machine.
7. Printing on Single color and multicolor on different Substrate.
8. Identification of problems in Gravure printing.

Text & Reference books:

1. Gravure: Process and Technology Publisher Gravure Associatio ofAmerica1991, ISBN18802900069,781880280002
2. Handbook On Printing Technology (Offset, Gravure, Flexo, Screen) Publisher: Asia Pacific Business Press Inc.; 2nd edition ISBN-10: 8178330873 ISBN-13: 978-81783308
3. The Complete Book On Printing Technology, Niir Board Publisher: Asia Pacific Business Press Inc. (2003)ISBN-10: 8178330520 ISBN-13: 978-8178330525

Course	Plastic and Polymer Based Packaging	Marking Scheme			Credits
		T	P	I	6
6BTech(PP)2		80	-	20	(CCC19)

Objective: In the era of packaging knowledge of various packaging techniques is necessary. Packaging is becoming one of the large segments of printing and related industry. This course intends to deal with additional knowledge of packaging requirements such as variety of substrates, finishing operations, its conversion etc.

Unit I: Introduction Polymerization techniques and processing methods

Co-Extrusion: Cast film co-extrusion, Blow film co-extrusion, Injection moldings, compression molding, Blow molding. Polymers in Packaging - Stretch blow mounded bottles, Closures and closure liners, Multilayer film manufacturing, Blister packaging, Shrink and stretch wrapping, Dry bond and wet bond adhesive lamination.

Unit II: Polyethylene

LDPE: Manufacturing, Effect of density, LDPE resins, additives, conversion techniques, properties, applications, developments, LLDPE: Introduction, Manufacturing, Properties, Processing, Modifications, Conversion, Material Handling, Application, HDPE: Introduction, Injection Maudling, Applications, Blow moulding, Extrusion, compression moulding and applications,

Unit III: Polypropylene

Introduction, Properties, Applications, Polypropylene copolymers, BOPP: Basic Categories of film and its qualities. Polycarbonate: Introduction, application in packaging.

Unit IV: Polystyrene

Properties, Grades, Processing: injection moulding, extrusion, sheet forming, applications. PVC, Nylon, Polyester: PVC: Introduction, Properties, Applications, Nylon: Introduction, Process, Technology of Co-extrusion, Applications, Polyester. Introduction, Properties, applications.

Unit V:Miscellaneous Polymers

Expanded Polyethylene: Properties and applications, Plastic Woven Sacks: Material, Method, construction, use, Polycarbonate: Introduction, application in packaging. Testing on Plastics: Introduction, Scope, and Preparation of sample, solubility test, melting behaviour, approximate density, Ignition test, Dry distillation test, chemical colour identification test, pyrolysis test, refractive index, basic equipments, and other testing measures for individual plastics.

Assignments/Practical Work:

1. Study of various polymers used in packaging industry.
2. Study various polymerisation techniques.
3. Study properties of polymers and their selection criteria for a package.
4. Testing methods of various polymers.
5. Detail study of miscellaneous Polymer.

Text & Reference books:

1. Plastics: Materials and Processing", 3rd Ed, Strong A. B., Pearson-Prentice Hall, 2006.
2. Polymer Science", 1st Ed, Gowariker V. R.,Viswanathan N. V.,Sreedhar J, New Age International Publishers, 1986.
3. Plastics Packaging: Properties, processing, Applications and Regulation, Selke, S. E. M., Culter, J. D., Hernandez, R. J, Carl Hanser Verlag, USA, 2004
4. Handbook of Packaging Plastics', 1st Ed, Athalye A. S., Multi Tech Publishing Co., 1999.
5. The Wiley Encyclopedia of Packaging Technology", 3rd Ed, Yam K. L, Wiley, 2009.

Course	Colour Science	Marking Scheme			Credits
		T	P	I	6
6BTech(PP)3		50	30	20	(CCC20)

Objective: Electronics Color Separation and Correction is an important pre-press level subject that deals with digital advancements in graphic arts industry. In digital imagining Concept of Color, color systems such as CIE LAB.

Unit I: Introduction to colour and Visibility

Sources of Radiant energy, Structure of human eye with parts function, Factors affecting visibility, Optical Filters, Various reflecting materials ,Basic colour theory, additive and subtractive colours, process colours, application of the colour theory in colour reproduction. Overview of colour reproduction from original to printing.

Unit II: Choosing a original for colour Reproduction and colour Measurement

Exposure level, colour balance, memory colours, contrast; highlight retouched original, evaluation the transparency. Basi Concept of colorimetric analysis, The CIE system, Basic photometry concept and the standard photometric system, Visual matching procedures.

Unit III: Colour Reproduction

Essential requirements of cameras, lens, illuminations filters and half tone screen for colour reproduction work Tone and colour controls Gray scale and colour control patches the ink/paper/print interaction Measurement and control of colou printing Using the densitometers. **Colour Separating methods** -Basic principles of colour separation Direct separatio method and Indirect colour separation method procedure, Fake colour separation method and procedures followed for making the black printer

Unit IV: Colour correction

Objectives of colour correction; Hand correction, Purposes and procedure followed; retouching techniques; correcting colours, tones and shades given inks and paper. Dot etching, purposes and procedure, flat etching, staging and etching, local reduction, blending; Masking; purposes of masking types of masking's; their clarification and uses; Electronic colour separation and correction.

Unit V: Planning for colour work & Colour proofing

Introduction & Working of image capturing techniques of Scanners & Digital camera; Press proofing methods and various pre-press proofing systems; uses and limitations of prepress sheet Interpreting pre press proofs and predicting, press results Control devices for proofing systems.

Colour appearance model

Visual response function and spectral properties of pigments, Neural models, Line elements of colour space.

Assignments/Practical Work:

1. Preparation of own colour control patches.
2. Preparation of Gray Scale .
3. Study of spectrophotometer curve.
4. Study of Colour Correction methods and its need.
5. Study of Software for colour separation.
6. Preparations of fake colour separation
7. Preparations manual colour separation
8. Study of electronic colour separation.

Text & Reference books:

1. The Reproduction of Colour in Photography, Printing & Television (4th) Fourth EditionHardcover – 1987 by Dr. R. W. G. Hunt (Author) Publisher: Fountain Press; Fourth Edition edition (1987)ASIN: B00I62HGNI
2. Miles Southworth& Donna South worth :-Colour Reproduction. Graphic Arts Publishing, 3.1 edition. ISBN 10: 1879847019 ISBN 13: 9781879847019
3. Handbook of Printing Processes (GATF publications) by Deborah L Stevenson (Author), Charles Lucas (Illustrator)

ublisher: Graphic Arts Center Publishing Company (December 12, 2011) ISBN-10: 0883621649 ISBN-13: 978-0883621646
4. Coor Science: Concepts and Methods, Quantitative Data and Formulae (Wiley Series in Pure and Applied Optics) Publisher: Wiley-Blackwell; 2nd Revised edition edition (25 August 2000) ISBN-10: 0471399183
5. The science of color(2nd Edition) *Edited by:Steven K. Shevell* ISBN: 978-0-444-51251-2

Course	Metal and Glass Based Packaging	Marking Scheme			Credits
		T	P	I	6
6BTech(PP)4.1		50	30	20	(CCE7)

Objective: Metal Based Packaging should know about Container, Foil, Collapsible Tubes, Aerosol Container GI drum. Used in Packaging Industry. Metal and Glass based packaging know about physical and chemical Properties.

Unit I: Metal containers

Manufacturing of metal containers – Metals for can making, Two and three piece cans, Types of cans –DRD, DWI and DI, Can closures and seaming, Chemistry of Can coatings and its application in food Packaging. Advantages and disadvantages of container packaging.

Unit –II: Aluminium Foils and collapsible tubes

Manufacturing of Aluminium Foil – Direct and indirect extrusion process, Conventional and continuous casting, Properties of Aluminium foils, Coating and printing, Application in Packaging including Laminates and metallized films. Advantages and disadvantages of foil packaging, Manufacturing of Collapsible tube – Metals for Collapsible tube, impact extrusion process, Tube drawing, coatings and curing for collapsible packaging, Printing process of collapsible tube, Testing for collapsible tube performance. Application of collapsible tube and Lamitube in packaging industry. Advantages and disadvantages of collapsible tube.

Unit III: Aerosol cans

Manufacturing of Aerosol cans – Metals for Aerosol cans , Components of aerosols, Working of aerosol cans, Filling in aerosol cans, applications in various packaging industries. Advantages and disadvantages of Aerosol cans.

Unit IV: G.I. Drums

01/09/2017

Manufacturing of G.I. Drums – Metals for G.I. Drums, Galvanization process, Coating in G.I Drums, Closures for G.I.Drums Advantages and disadvantages of G.I. Drums

Unit V: Glass

Manufacture of Glass, Types of glass for commercial use, Application of Glass as packaging material, printing on glass substrates, Advantages and disadvantages of Glass in packaging industry.

Assignments/Practical Work:

1. To Study procedure of Metals for can making.
2. Comparative study of design used for various metal and glass container.
3. To study aerosol can making Process.
4. To study of Manufacturing of G.I. Drums.
5. To study manufacture of Glass containers.

Text & Reference books:

1. Packaging design and performance- Frank Paine.ISBN 10: 0902799274 ISBN 13: 9780902799271Publisher: Pira International, 1990
2. Packaging Technology: Fundamentals, Materials and Processes (Woodhead Publishing in Materials) Hardcover – by Anne Emblem (Editor)Publisher: Woodhead Publishing (29 October 2012) ISBN-10: 1845696654 ISBN-13: 978-184569665

Course	Print Finishing and Converting	Marking Scheme			Credits
		T	P	I	6 (CCE8)
6BTech(PP)4.2		50	30	20	

Objective: To learn the printing finishing methods and selection of materials and processing methods for the job.

Unit I: Binding Materials

Print Finishing-classification, materials, preparation and treatment of covers; adhesives-types, manufacturing, theory of adhesion; miscellaneous materials; trends and development -in finishing operations.

Unit II: Guillotines

Joggers; pile hoist; cutting-overview, work preparation; cutting machine- parts, types of motion, principles of single knife guillotines. Semi-automatic and automatic programming systems, three knife trimmers; operation, mechanism and maintenance of guillotines, various adjustments, knife changing and general maintenance; operational procedure of sensors, hydraulic systems; problems and remedies during cutting; cutting webs, die-cutting

Unit III: Folding

Principles of folding, types of folding for sheet and web; methods of feeding and delivery; folding production line, folding terminology, folding diagram, folding scheme; mechanism, operation and adjustment of folding machines; additional features-fold glueing, perforators, creasers and slitters; folding boxes.

Unit IV: Gathering and Securing Operation

Principles of gathering, types of machines, feeders, delivery, in-line production; securing characterization, wire stitching; thread stitching; adhesive binding; Hardbound binding, sewing-types, feeders and delivery; mechanical and loose leaf binding: general principles, materials, styles, purpose of each method.

Unit V: Miscellaneous Finishing Operations and Automation in Book Binding

Edge treatment-characterization, edge staining, bookmark, rounding and backing, headband, edge treatment operation in production lines; case making -characterization, producing book covers. Materials, case making; casing in, inserting, jackets; Principles and operation of perforating, punching, drilling, round comering, indexing, creasing, embossing and numbering; foil stamping; varnishing, lamination-types. Aqueous and UV curing Machines; production lines-cutting lines for labels, mailing of folded products, hard covers, finishing short print runs, maintenance, production capacities, production control, network analysis.

Assignments/Practical Work:

1. Study of various controls, operation and mechanisms of
   - Cutting Machine
   - Folding Machine
   - Perfect Binding Machine
   - Wire Stitching Machine
   - Lamination Machine (Wet and Dry types)
   - Die-cutting and Punching
2. Mechanical and Loose leaf binding
   - Comb binding
   - Spiral binding
   - Wire-o-binding
   - Rimming
3. Preparation of
   - End Papers
   - Case Bound
   - Perfect Bound
   - Saddle and Side Stitch Binding
4. Study of Binding Materials
5. Study of Gathering and Securing Operation.

Text & Reference books:

1. Handbook of Print Media: Technologies and Production Methods Hardcover– Import, 31 Jul 2001 by Helmut Kipphan (Editor) ISBN-10: 3540673261ISBN-13: 978-3540673262
2. Basic Bookbinding Paperback – June 1, 1957by A. W. Lewis (Author) Publisher: Dover Publications (June 1, 1957) ISBN-10: 0486201694ISBN-13: 978-0486201696
3. A.G.Martin, "Finishing Process in Printing", Focal Press Ltd., Britain, 1980.
4. Ralph Lyman, "Binding and Finishing", GATT. 1993.
5. T.J.Tedesco, "Binding, Finishing and Mailing : The Final Word". GAFF. 1999.

Course	Machine Design	Marking Scheme			Credits
		T	P	I	3
6BTech(PP)5		40	-	10	(SEC4)

Objective: To study the design of shaft, springs, gears, belts and bearings used for printing machines

Unit I: Stress Analysis

Type of stresses-stress strain diagram in tension-mechanical properties of materials, static stress equation in axial, bending and torsion loadings, criteria for failure, factor of safety-combination of normal and shear stresses, principal stresses, theories of failure, variable loads, fatigue strength, SN curves, sobererg and Goodman equations, factors affecting fatigue limit.

Unit II: Design of Shafts

Forces on shafts due to gears, belts and chains, estimation of shaft size based on strength and critical speed, selection of material.

Unit III: Design of Springs

Stresses and deflection in round wire helical springs-accounting for variable stresses, concentric springs, design of helical and leaf springs.

Unit IV: Design of Bearings

Hydrodynamic theory, Summerfield number, dimensionless parameters, Optimum journal bearings, Design problems in journal bearings, Newer bearing materials, Types of antifriction bearings, static and dynamic and capacity, cubic mean load, variable load, selection of antifriction bearings.

Unit V: Design of Gears & Selection of V-Belts and Chains

Classification of gears, gear tooth terminology, base circle and pressure angle design procedure for spur, helical, bevel and worm gears. Selection procedure for V belts and chains for given power and velocity ratio.

Assignments/Practical Work:

1. Study of various controls, operation and mechanisms of
   - Cutting Machine
   - Folding Machine
   - Perfect Binding Machine
   - Wire Stitching Machine
   - Lamination Machine (Wet and Dry types)
   - Die-cutting and Punching
2. Design of Bearings
3. Design of Gears & Selection of V-Belts and Chains
4. Designing and sketching of components contained in syllabus.

Text & Reference books:

1. Faires, V.M., "Design of Machine Elements". The Macmillan Co.,London.
2. Dobrovalskyet., "Machine Elements", MIR Publications, 1980.
3. Shigley, "Mechanical Engineering Design" : McGraw Hill, 1992.
4. Faculty of Mechanical Engineering PSG College of Technology, "Design Data Hand Book", DAV Printers, Coimbatore, 1993.

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Technology of Web Offset	Marking Scheme			Credits
		T	P	I	6
7BTech(PP)1		50	30	20	(CCC21)

Objective: Study about Web offset technology, its component & complete working procedure.

Unit I: Development and Components web offset presses

Full size and mini web presses ; basic types of web offset presses specially used for newspaper and magazine production in single and multicolor, Factors to be considered for selecting the press; Infeed, tension control Pre-conditioners, drier and chill rolls, folders, sheeters and winders, Adjustment, operation and maintenance of the major components

Unit II: Inking , dampening & web control systems

Conventional and non-conventional dampening systems, UV inks and setting systems Causes and correction of ink-related problems Properties and requirements of heat set inks; Roll stands and automatic pasters, Detection of web breaks and control of tension, Web Flutter, cause and correction of misregister Control of fan out, Side lay, cut-off, web-to-web and ribbon control.

Unit III: Plate ,Blanket &Auxiliary equipment

Various types of in-built and optional equipment availability for web-offset and their uses; equipment essentially needed for newspaper & magazine production; Plate and blankets :Various types used for web-offset their characteristics, merits and demerits for specific work, Cylinder pressures and Printing Make-ready

Unit IV: Folders

Introduction, folding principles, parts of folder, combination folder, ribbon folder, double-former folder ,the me chances of folding process of jaw fold, chopper fold mechanism. Operation of collect cylinder, press folders double former prefolder, flow folders, insert folders

Unit V: Inline finishing

Introduction, gluers, pester wheels, remoisterable pattern gluers, segmented gluers, envelope pattern gluers, backbone gluers. Pattern perforating and numbering units-sheeters, variable rotary cutters. Auxiliary Equipments -Remote control console, Plate scanners, scanning densitometer, closed-loop system, web preconditioners, sheet cleaners, ink agitators, water coded ink oscillators, fountain solution recirculation systems, fountain solution mixers, refrigerating fountain solution, automatic blanket washers, side lay sensors, web break defectors, re moisturizers-liquid applicator system, roller applicators systems, antistatic devices, Imprinters, Perfectos, cutoff controls, stroboscope, synchroscope , counters-Denex laser counter, stobb counter.

Assignments/Practical Work:

1. Study multicolor job printing.
2. Study trouble shooting during printing.
3. Study of electronic panel.
4. Study of blanket and plate cylinder setting.
5. Study of damping roller setting.
6. Study of ink roller setting.
7. Study of web-breaks.
8. Study of web folders.

Text & Reference books:

1. Web Offset Press Operating Hardcover – by Graphic Arts Technical Foundation (Corporate Author), David B. Crouse (Editor) Publisher: Graphic Arts Technical Fndtn; 4th edition (1 October 1996) ISBN-10: 0883621819 ISBN-13: 978-0883621813
2. Hand Book Of Offset Printing Technology Paperback – 2008 by Eiri Board (Author) Publisher: Engineers India Research Institute (2008) ISBN-10: 8186732829 ISBN-13: 978-8186732823
3. The Complete book on Printing Technology by NIIR board Published by Asia Pacific Business press ISBN 81-7833-052-0

Course	Ink Technology	Marking Scheme			Credits
		T	P	I	6
7BTech(PP)2		50	30	20	(CCC22)

Objective: To Knowledge of Different type Printing ink for different process, Its Ingredient and its Properties.

Unit I: Introduction To Ink Technology

Different Printing Processes and types of inks used; Pigment used in Printing – organic ,inorganic ,metallic compounds ,White, Black, Ink terminology pH, Viscosity, Thixotropy, Length, Tack, Water in Ink emulsion and Ink in Water emulsion.

Unit II: Ingredients of Inks

Printing ink ingredients. State the functions of the ingredients, Vehicles - Function &Types - Drying vehicles, Non Drying vehicles; Resins -Natural resins, Synthetic Resins Solvents - Hydrocarbons, Aliphatic, Alcohols, Wash up solvents Additives - Plasticizers, Waxes, wetting agents, Anti set off, Shortening compounds, Reducers, Stiffening agents ; Driers - Liquid driers, Paste driers, Inhibitors, Accelerators, extenders, anti oxidants, waxes. Oils- vegetable drying oils, semi drying oils, non drying oils.

Unit III: Inks used for different Printing Processes & Testing

Different printing inks. Ink drying methods. Offset inks - General formulation, properties ;Gravure inks - General formulation, properties ; Flexographic inks - General formulation, properties, Screen Printing Inks –General formulation, properties Specialty inks - Toners, Ink jet inks, magnetic inks, OCR inks, Scratch off inks, water washable inks; Q.C Tests- viscosity, Heat- sealing, shade matching , odour and Taste, Water and bleed Resistance, ink film thickness, light fastness, rub resistance test, crumpling resistance test, grinding control, Block Resistance, colour control, Control of the rheological properties, control of drying time, control of various specific properties.

Unit IV: Ink Manufacturing and Properties

Ink manufacturing process , Infer and end use properties ;Liquid Ink Manufacture –Mixing & milling ,ball mill, pearl mill, sand mill, bead mill, shot mill. Trends and developments in ink process; Paste Ink Manufacture :Mixing & milling, three roll mill;

End use properties : Rub and scuff resistance, Adhesion flexibility block resistance, Skid & product resistance, Light fastness, heat seal resistance, lamination tests; Optical properties -Opacity, Gloss.

Unit V: Energy – Curing Inks and Coatings

Energy Curing ink System, Advantage or Disadvantage of curing system; types of System :Microwave, Infrared, UV system, radiation curing inks, ink cure considerations UV coatings and Ingredients, Cationic curing, electron beam curing.

Assignments/Practical Work:

1. Study of different samples of inks.
2. Study light fastness test.
3. Study ink tackiness test.
4. Study printed samples of different printing processes.
5. Study of ink viscosity test in paste & liquid
6. Study of introduction to various chemicals used in printing.
7. Study various properties of ink
8. Study ingredients of ink

Text & Reference books:

1. The Printing Ink Manual: 4th edition Paperback – Import, 1 Mar 2012by Robert Leach (Author) Publisher: Springer; Soft cover reprint of the original 1st ed. 1988 edition (1 March 2012) ISBN-10: 1468469088ISBN-13: 978-1468469080
2. Complete Technology Book on Printing Ink Paperback – Import, 2003 by NIIR Board (Author) Publisher: Asia Pacific Business Press Inc. (2003) ISBN-10: 8178330482 ISBN-13: 978-8178330488

Course	Specialized Packaging	Marking Scheme			Credits
		T	P	I	
7BTech(PP)3		80	-	20	6 (CCC23)

Objective: To study about New trends of Printing & packaging for various application & materials

Unit I: Lamination Process & Machineries

Principles, types (hot, cold, pattern, interactive) Lamination machine- Hot lamination machine, Cold lamination machine.

Unit II: Thermoforming :match mould forming, vacuum forming, Pressure forming ; shrink wrap, skin pack, blister pack, wrapping machines, Strip packing, stretch packing, Pasting machine, stitching machine, sealing machine, Pouch sealing packaging .

Unit III: Wooden containers & die cutting

Classification of wood species identification, quality control in wood, principles of construction of box and crates, styles of box and crates, choice of thickness, width of planks, battens, Case closures – captive screw closures, palm bolts, strap bolts, Wire bound boxes, large frame wooden cases, wooden casks Instruments for strapping, nailing; Die cutting processes: cutting, scoring, creasing, bandings, perforating, punching, Slitting Process, bending, cutting.

Unit IV: Packaging closures And Label Printing

Types of Packaging Closures, Peelable Seal lids , Temper Evidence, Testing & performance Machines used in making caps and closures; trends in label type: self adhesive , wet glue, specification, printing process, Future Trends.

Unit V: Packaging Trends

Product, size, style, shape, durability, aroma, specialty, met pack, indicative packing, show through packing, interactive, self cooling & heating packaging , Braille printed packages.

Assignments/Practical Work:

1. To study of Lamination Process.
2. To study Thermoforming Process.
3. To study of Wooden containers & die cutting
4. To study of closures for packaging.
5. To study recent Packaging Trends.

Text & Reference books:

1. Advanced Thermoforming- Sven Engelmann , Publisher: Wiley; 1 edition (June 19, 2012), ISBN-10: 0470499206 ISBN-13: 978-0470499207
2. Fundamentals of Packaging Technology-FOURTH EDITION , Walter Soroka, CPP- Publisher: Institute of Packaging Professionals; 4 edition (21 January 2010)- ISBN-10: 1930268289
3. Packaging Machinery Handbook: The complete guide to automated packaging machinery including packaging line design Paperback – November 17, 2012. by John R Henry CPP (Author), ISBN-10: 1479274518 ISBN-13: 978-1479274512

Course	Machine Maintenance Management	Marking Scheme			Credits
		T	P	I	
7BTech(PP)4.1		50	30	20	6 (CCE9)

Objective: To study various Maintenance activities, Procedure of Printing industry.

Unit I: Wear and tear in Printing Equipment & Lubrication

Causes of wear and tear remedies. Wears causes, effects and reduction methods, State the effects of friction in printing equipments and the steps to reduce it; Lubrication: Methods, Characteristics, manufacturer's service manual. Compare the features of the lubricating methods, Describe centralized lubrication system.

Unit II: Erecting and Testing

Equipment needed for erection, selection of location and environmental condition-erection procedure for various prepress printing and finishing equipments and machinery

Unit III: Repairs and Reconditioning

Principles of reconditioning - repair methods for various parts , Roller copperising and rerubberising ,ebonite covering damping and inking systems - paper transport systems and feeder head

Unit IV: Cylinders, Bushes and Bearings

Cylinder contraction, testing run out and taper, cylinder bearing supports, eccentric bushes removal and fixing of bushes, changing of oil seals maintenance of bushes and bearings.

Unit V: Maintenance procedures

Need and importance of maintenance - Definition, types, Maintenance policies, Maintenance organization, Maintenance of pumps and compressor, Maintenance Processes for Printing Machine, Responsibilities of Printing maintenance department, up keeping and overhaul of printing Equipment steps to overhaul components of printing machines and auxiliary systems in printing processes; Identification & rectification of faults, Maintaining different types of Letterpress, Offset, Gravure & Flexo

Machine

Assignments/Practical Work:

1. Study various type of Lubrication System.
2. Study of procedure for erection of machine.
3. Study Repairs and Reconditioning.
4. Study cylinders, bushes and bearings.
5. Study importance of maintenance of machine.
6. Study various type of maintenance policies in printing industry.

Text & Reference books:

1. Plant Maintenance with SAP - Practical Guide Hardcover –by Karl Liebstuckel (Author) Publisher: SAP Press; 3rd Nev edition (31 December 2013), ISBN-10: 1592299296 ISBN-13: 978-1592299294.
2. Total Production Maintenance: A Guide for the Printing Industry Perfect Paperback – by Kenneth E. Rizzo Publisher: Graphic Arts Center Publishing Company; 3 edition (14 April 2008) ISBN-10: 0883626209 ISBN-13: 978-0883626207.
3. Maintenance Engineering and Management Paperback – by Mishra R.C (Author) Publisher: Prentice Hall India Learning Private Limited; 2 edition (2012) ISBN-10: 8120345738 ISBN-13: 978-8120345737.

Course	Printing Plant and Layout Design	Marking Scheme			Credits
		T	P	I	6
7BTech(PP)4.2		50	30	20	(CCE10)

Objective: To introduce the different plant layout and press construction.

Unit I: Site Selection

Strategic issues of location. The supply-distribution system, dynamic nature of plant location. Location strategy-factors influencing choice of location. State regulations on location. Backward areas and industrial policy. Government policies for decentralization, industrial estates, comparison of locations-urban v/s rural areas advantages, sub-urban area. Economic survey of site selection. Case study.

Unit 2: Plant Layout

Objectives of good plant layout, principles of plant layout, importance of plant layout, Types of plant layout -product layout or live layout -process layout or functional layout-combination layout -static layout or fixed position layout, situations problem, factors influencing plant layout, Methods of plant and factory layout-operation process chart, flow process chart, flow diagrams, string diagrams, machine data cards, templates three dimensional models, correlation chart, travel chart, load path matrix method. Symptoms of bad layout. Flow pattern-line flow, L-type flow, circular flow, U-type flow, S or inverted S combination of U and line flow pattern. Characteristics and applications. Factors governing flow patterns: Combination of line flow and S-type of pattern. Combination of line flow and circular type. processing upwards. Inclined flow. Workstation design, storage space requirements.

Unit III: Layout Procedure

Basic data, analysis, equipment and machinery required, select the material handling system, sketch plan of the plot for making factory building. Determine a general flow pattern, design the individual workstation. Assembly the individual layout into the total layout, determination of storage space required, work-flow diagrams in work stations and allocation of areas on plot plan, plan and locate service areas, make master layout. Checking final layout, official approval of the final layout, installation. Case study.

Unit IV: Press Building

Introduction, types of press building -single story building, high bay and monitor type buildings, multi-storey buildings, building of special types. Comparison between single storey and multi-story building. Types of construction of factory building Wood frame construction, brick construction, slow burning mill construction, steel frame construction, Reinforced concrete construction, precast concrete construction. Specific parts of factory building-roof, walls. Floor factors affecting press building· nature of manufacturing process-flexibility -expandability -service facilities -employee facilities-lighting-heating-ventilating-air conditioning-appearance-durable construction-security measures-noise control.

Unit V: Process Engineering

An analytical approach: Heuristic and other methods of line balancing. Planer single facility location problems. Mini sum examples, insights for mini sum problem, mini sum location problem with distance. MLP with Euclidean distance. **Managing Printers Materials Resources**: Material management overview, duties, purchasing function, links with other areas, inspection and quality control, materials storage, materials identification and location, stock records, material handling equipment, training, stock and inventory control, waste materials, disposal, packing and dispatch. **Materials Handling methods**: Importance of material handling department. Receiving. Service roads and dock approaches. Dock doors. Dock levellers. Dock seals and shelters. Dock accessories. Dock platforms. Operational procedures. Load platforms: pallets Types: Stringer pallet. Block pallet. Materials used to construct pallets. In-plant vehicles. Pallet truck. Walkie stacker. Lift truck. Very-narrow-aisle lift vehicles. Safety and training. Storage rack classification. Two deep pallet storage racks. Drive-in/Drive-thru pallet storage racks. Stacker racks. Cantilever storage racks. Pallet flow racks. Mobile racks. Cranes, Conveyor systems. Warehouse: Physical description. Waste and trash handling.

Assignments/Practical Work:

1. To study of Site selection procedure.
2. To study about Plant Layout procedure.
3. To study printing press Plant layout structure.
4. To study process & product plant layout.
5. To study of Process Engineering

Text & Reference books:

1. Francis R.L. and White J.A. (2000)"Facility layout and location" GATF, USA
2. Khanna O.P. (1996) "Industrial Engineering AND Management" Dhanpatraiand Sons, New Delhi
3. Mahajan M. (2001) "Industrial Engineering and Production Management" Dhanpatraiand Sons, New Delhi
4. Geis A.J. and Addy Paul L. (2000)"Materials handling for Printer"GATF,USA
5. Facility Layout and Location: An Analytical Approach (Prentice-Hall International Series in Industrial & Systems Engineering) Paperback – Import, 1 Oct 1991 Richard L. Francis (Author), F. McGinnis Jr. (Author), John A. White (Author) Publisher: Pearson; 2 edition (1 October 1991) ISBN-10: 0132992310 ISBN-13: 978-0132992312
6. Practical Plant Layout Hardcover – Import, 1 Jan 1956 by Richard Muther (Author) Publisher: McGraw Hill Higher Education (1 January 1956) ISBN-10: 0070441561 ISBN-13: 978-0070441569
7. Industrial Engineering & Production Management Unbound – 1 Jan 2012 by Mahajan (Author) ISBN-10: 8177000470 ISBN-13: 978-8177000474
8. Materials Handling for the Printer (Anglais) Broché – décembre 1997de A. John Geis (Auteur), Paul L. Addy (Auteur) Editeur : Graphic Arts Technical Fndtn; Édition : LATEST EDITION! (décembre 1997) ISBN-10: 0883621703 ISBN-13: 978-0883621707

Course	Industrial Training	Marking Scheme			Credits
		T	P	I	3
7BTech(PP)5		-	40	10	(SEC5)

Objective:

1. Industrial Training (4 Weeks during vacation) –80 contact hours workload is expected during the training including the preparation and presentation time. 40 hours are invested in training during vacation, remaining 40 hrs –2 hrs/week will be used for the rest of the work
2. Guidelines and Evaluation Criteria for the Industrial Training will be decided by the Committee duly proposed by the Head of the Department.

Assignments/Practical Work:

Text & Reference books:

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

Course	Security and Specialized Printing	Marking Scheme			Credits
		T	P	I	
8BTech(PP)1		80	-	20	6 (CCC24)

Objective: To Study about Security printing & properties of Ink & Paper.

Unit I: Principles of stochastic screening

Spot patterns. Graininess or noise. Combining AM and FM screening, Screen angles, Spot size, Claimed benefits for FM screening. Absence of rosettes and moiré patterns; Improved rendition of detail. Smoother

Unit II: Print &Specification Of MICR

Character Alignment, Spacing, Dimension, Irregularity Properties of MICR ink & Paper Properties.

Unit III: BANK Cheque:

Design, format and Specification - Size, Border, Back ground of Bank Cheque; Quality Testing of Properties and Testing of MICR Paper, Water mark & its use .

Unit IV: Cheque Layout & Security Inks

Explain the design, Size, Font Type, Size of different type of Banking forms or Document Current Account, British Bank, Bank Draft, Font & Character; Types of different types of security feature inks (Types of security ink fluorescence, phosphorescence, Thermo chromic inks and Invisible Phosphorescent inks); Security threads & Fibbers.

Unit V: New Trends Of Printing

Hologram Printing &, Application ;Colour shifts, RFID printing & application *augmented reality* Trend in future , BAR code system, Printing, Specification, QR code, Lenticular printing.

Assignments/Practical Work:

1. Study about AM & FM Screening
2. Study of MICR Ink & Paper Properties
3. Study & understand BAR Code Printing
4. Study of Importance of Cheque layout & Security ink
5. Study of Design format and Specification for security printed product.

Text & Reference books:

1. Introduction to Security Printing Book by Richard D warner (Publisher -Graphic Arts Center Publishing Company 2005-07-30. ISBN-10 : 0883623757 ISBN-13 : 9780883623756
2. Barcode Technology and Implementation By AS Bhasker Raj (E-Book) Tata McGraw Hill Publishing Company 2007 IsBN-13 :978-0-07-463849-1 ISBN-10:0-07-463849-1
3. Bar Codes: Design, Printing and Quality Control Hardcover – March, 1994by William H. Erdei (Author) Publisher: Mcgraw-Hill (Tx) (March 1994) ISBN-10: 0070194483 ISBN-13: 978-0070194489
4. R.Narayanan, "Computer Stationery and MICR – Cheque Production", Association for Research and Development in Printing, 1998

Course	Estimating and Costing	Marking Scheme			Credits
		T	P	I	6
8BTech(PP)2		80	-	20	(CCC25)

Objective: To study the costing principal and budgeting method for printing jobs and estimating the requirement for the job printing.

Unit I: Cost Accountancy

A review of costing systems, Relationship between cost control & budgetary control, Marginal costing and profit analysis.

Unit II: Budgeting

Types of budgets, Budgetary control, Budgetary control as an aid to management. Preparing sales forecasts and budgets fo printing & allied organisations.

Unit III: Estimation

Classification of costs in printing, Costing direct materials. Costing of machine operations, Costing of manual operation procedures for preparing estimates & submitting quotations, conditions for print contracts.

Unit IV: Investment Analysis

Time value of money, compound value, present value, calculations, Annuities, pay back method, Average rate of retur method and internal rate of return method.

Unit V: Break Even Analysis

Models, calculation of Breakeven point, Margin of safety, Sensitivity Analysis and profit graphs.

Assignments/Practical Work:

1. Study the importance of Costing & estimating in industry by live examples such as

A) Ink consumption
B) Material consumption
C) Preparation of job sheet
D) Power consumption
E) Break even analysis

Text & Reference books:

1. "Cost Accounting for Printers", Part I and II, British Printing Industries Federation, 1982.
2. Vohra, N.D., "Quantitative Techniques in Management", Tata McGraw Hill Publishing Company Limited, 1990.
3. Battacharya, S.K. AND John Dearden, "Accounting for Management, Text & Cases", Vikas Publishing Home Pvt. Ltd., New Delhi, 1990.
4. Venkataraman, K.S. & Balaraman, K.S., "Estimating Method and Cost analysis for Printers". Ramya Features & Publications, 1987.
5. Mendiratta, B.D., "Printer's Costing & Estimating", Printing India Publications, Pvt. Ltd., 1999.
6. Hugh, M. Peirs, "Print Estimators, The Handbook", BPIF, 1996 Vikas Publishing Home Pvt. Ltd., New Delhi (1990).
7. Printing Estimating: Costing Methods for Digital and Traditional Graphic Imaging (Graphic Comm (Non-Software)) by Philip k. Ruggles 25 Apr 1996 ISBN-10: 0827364393 ISBN-13: 978-0827364394 ISBN-10: 082733805 ISBN-13: 978-0827338050
8. A Text Book of Estimating and Costing- M. A. Aziz Zoberi Publisher Zoberi Publisher, 1967 ISBN-10: 082733805 ISBN-13: 978-0827338050
9. Printer's Costing and Estimating Paperback – 1 Jan 2010 by B.D. Mendiratta (Author) ISBN-10: 8190982869 ISBN-13: 978-8190982863

Course	Major Project	Marking Scheme			Credits
		T	P	I	6
8BTech(PP)3		-	80	20	(CCC26)

Objective: To apply the concepts covered in class and refine your writing and presentation skills.

Students of are required to do a project and submit a project report based on the work done by him/her during the project period.

Project time/Man Hours

- The B. Tech. (PP) Projects would be approximately 90 man-hours (in a span of 15 weeks) and carries a total of 150 marks (100 Ext 50 IA)
- Project work should be based on syllabus or beyond or application area of the subject learned.
- Number of students in a project group will not be more than ten for B. Tech. (PP).
- Synopsis of the project work should be submitted within the first 15 days of the duration.
- Project report should be submitted 15 days before the final exam for evaluation.

Project development:

The project work shall be evaluated in two different dimensions.

I. The Product
II. The process

I. The Product

The final product developed during the project work should be innovative need based where

1 The product developed should have a meaningful contribution in Printing and Packaging and or Packaging like

a. Working model
b. Printed Product design/Development
c. Package design and Development.

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II. The Process

The process shall be evaluated in the following areas:

1 Application
2 Clarity in Need Identification/objectives (Converting this into Idea)
3 Idea how to implement/Evidence for each idea
4 Reduce manpower
5 Reduce wastage
6 Increase /Improve production
7 Design
8 Development
9 Validation/performance
10 Ability to defend the ideas through questioning and viva.

Course	Digital & Advanced Printing Processes	Marking Scheme			Credits
		T	P	I	6
8BTech(PP)4.1		50	30	20	(CCE11)

Objective: It's Study of Advance printing Process Which is currently used in Printing Industry.

Unit I: Digital Documents

Introduction to Digital Printing & fundamentals Pixel image, Digital image, Digitization, Half toning colour reproduction, Digitization, Half toning colour reproduction; Documentation: Image file formats, TIFF, EPS JPEG files text files and past description languages; Acquiring: Scanning of different original, Selection of technology of Programme. Transfer of Digital Photographs.

Unit II: Colour Management & Demand of Digital Printing

Rendering Type line Art and images. Colour management, Introduction and future, Characterizing, input and output device use of c Market & Applications: Introduction, Defining on demand Defining Digital Printing. Defining variable printing. Typical lengths. Short-run process colour printing.

Unit III: On demand printing & Publishing

Concepts, Future on-demand. New technologies shift existing methods. Economics of on demand printing - Economics of long run. Advantage for the buyer. Efficiencies of Digital on demand work flow. Short-run pricing paradox.

Unit IV: Ink Jet and Thermal Transfer Digital Printing

Study of working principle, construction, application and classification or types of ink jet digital printing system ;Study of working principle, construction, application and classification or types of thermal transfer digital printing system; Study of required properties of substrates used in ink jet and thermal transfer digital printing system.

Unit V: Advance Printing Technique

Advance printing processes and techniques and Hybrid systems. Concept Printing, 3D printing, sculpture, bio, food, structure

and other innovative areas. Nano printing and recent engineering trends in printing and packaging.

Assignments/Practical Work:

1. Study of Different files Format and their creation.
2. Study of Color Calibration & Measurement System.
3. Study & practicing of customized and variable data printing.
4. Study of Inkjet Printing & application.
5. Study of 3D Printing & software tools.
6. Study of Thermal Printing Technology.

Text & Reference books:

1. Digital Printing On demand Printing- Howard M. Fen ten, Frank J. Romano, Publisher: Printing Industries Press; 2 edition (March 1997)
2. Beginning Design for 3D Printing Paperback – Import, 9 Oct 2015by Joe Micallef (Author) Publisher: Apress; 1st ed. edition (9 October 2015) ISBN-10: 1484209478 ISBN-13: 978-1484209479
3. A Guide of Graphic ART Production by Kaj Johansson (Author), Peter Lundberg (Author), Robert Ryberg (Author), Publisher: Wiley; 3 edition (November 1, 2011)ISBN-10: 0470907924,ISBN-13: 978-0470907924.

Course	Printed Electronics	Marking Scheme			Credits
		T	P	I	6
8BTech(PP)4.2		50	30	20	(CCE12)

Objective: To familiarize and understand the applications of various printing process in electronics Industry

Unit I: Introduction

Printed electronics, Printing technology for electronics manufacturing, PE technology and their benefits, products used for PE

Unit II: Organic & Inorganic printable electronic materials

Introduction, Organic conductive material(History, Polymer used),printed organic and polymer semiconductors, other printable organic materials, Inorganic printable electronic materials- Introduction, Metallic materials and processing, transparent oxide, single wall carbon nanotube, grapheme etc

Unit III: Pre & Post printing Process: Pattern

Design, modification of surface energy, surface coating, Embossing and nano imprinting Post process Sintering. UV curing and annealing

Unit IV: Printing process and equipments

Introduction, Jet printing technology (Inkjet and aerosol printing), Direct printing process and Indirect printing process with their advantages and disadvantages.

Unit V: Applications and Future prospects of Printed electronics

Introduction, Application areas at different field such as Organic photovoltaic, flexible display, organic lighting, Electronics and components, Integrated smart systems etc Challenges for printed electronics-Materials, printing process and equipments, Encapsulation, Design methodology and standardization.

Assignments/Practical Work:

1. To study of Inkjet in Electronics printing.
2. To study and understand organic & inorganic materials used in Electronic Printing.
3. To study and understand Futuristic potential printed electronics.
4. To study Pre & Post printing process.
5. To study of applications and future prospects of Printed electronics.

Text & Reference books:

1. Printed Electronics: Materials, Technologies and Applications by Zheng cui Publisher: Wiley; 1 edition (September 26, 2016) ISBN-10: 1118920929
2. Applications of Organic and Printed Electronics: A Technology-Enabled Revolution by Eugenio Cantatore Publisher: Springer; 2013 edition (September 19, 2012) ISBN-10: 146143159X

Course	Food and Agro Based Packaging	Marking Scheme			Credits
		T	P	I	3
8BTech(PP)5		40	-	10	(SEC6)

Objective: Packaging of Processed Foods, Aseptic Packaging, Packaging of Horticultural crops and factor related with Packaging industry.

Unit I: Introduction: Packaging of Processed Foods

Properties, Glass and tin containers, Caps and closures, Other packaging materials, Packaging Machines, Food Processing Techniques: Objectives, Methods, Effects of processing. Packaging of Meat, Fish & Poultry: Introduction, Properties of such food products, Package selection according to spoilage rate criteria and transport conditions.

Unit II: Packaging of Flesh foods & Fruit Juices

Flesh foods: Characteristics, Processing Methods, Packaging, and Fruit Juices: Introduction, suitability of containers, packaging in flexible materials. Packaging of Dairy Products: Requirements, Package characteristics, Materials and their properties, Packaging of Biscuits, Bread & Confectionery: Introduction, Packaging Materials Used.

Unit III: Aseptic Packaging

Sterilization of Packaging Materials, Using Aspetic System, Aseptic Packaging, Sterilization by Irradiation, Radiation Sterilization - Process Norms, Guidelines & Applications. Packaging of Ready to Use Foods: Classification, objectives, choice of material, factors affecting RTS products, Materials used in Ready to use foods, advantages of RTE.

Unit IV: Packaging of Horticultural crops

Introduction, reasons for spoilage, role of ethylene and its effects on quality, removal of ethylene. Packaging of Fertilizers and Pesticides: Material, Developments, Printing, and optimization of materials.

Unit V: Packaging wastes

Effluent treatment and waste minimization. To study reuse, reduce, recycle concept related with printing and packaging.

Assignments/Practical Work:

1. Study of selection criteria for various Packaging material used for processed foods.
2. Study of Packaging of Flesh foods & Fruit Juices.
3. Study of Aseptic Packaging.
4. Study future of Food and Agro Based Packaging.
5. Study of Packaging wastes.

Text & Reference books:

1. Food processing and Agro based industries; Author: EIRI books; Publisher: Engineers India research institute; Edition 2004; ISBN: 9788186732120
2. Modern technology of food processing and agro based industries; Publisher: National Institute of Industrial Research; Edition: 2005; ISBN: 108186623345

Course	OPEN ELECTIVES	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	

SELECT ANY ONE FROM THE FOLLOWING

FOR DETAILED SYLLABUS REFER TO OPEN ELECTIVE SECTION (PAGE 109)

Subject Code	Course of study	Paper Numerical Value	Subject Name
BTech(PP)6	OE1	4756	Management Information System
BTech(PP)6	OE2	4757	TQM for Graphic Art Industry
BTech(PP)6	OE3	4758	Psychology of Printing and Packaging
BTech(PP)6	OE4	4759	Computer Applications in Printing & Packaging
BTech(PP)6	OE5	4760	Digital Electronic Circuits
BTech(PP)6	OE6	4761	Multimedia Technology
BTech(PP)6	OE7	4762	Advertising and Multimedia
BTech(PP)6	OE8	4763	International Logistics and Legal Environment
BTech(PP)6	OE9	4764	International Trade and Relations
BTech(PP)6	OE10	4765	Print Media Ethics
BTech(PP)6	OE11	4766	Printing Management and Entrepreneurship Development
BTech(PP)6	OE12	4767	Image Processing
BTech(PP)6	OE13	4768	Quality Control and Supply Chain Management
BTech(PP)6	OE14	4769	Industrial Safety Management

OPEN ELECTIVES SECTION

Course	Management Information System	Marking Scheme			Credits
		T	P	I	
BTech(PP)6		40	-	10	3 (OE1)

Objective: To study the organisation system concept with its functional management and managing the database

Unit I: The Organisation & System Concept

Its Manager, Structure and activities, Introduction, The environment of organisations -Information flows, Information needs and sources of information, Types of management decisions and information need Business and Technical Dimensions of information. System classification, System concept, system characteristics, The elements of systems; Input, output, process, feedback control and boundary, System function and operations, Transactions processing Information system. Information system for managers. Intelligence information systems, The meaning and role of MIS.

Unit II: System Analysis and Design

The work of system analyst, The assignment brief and mutual investigation, feasibility study, system design, Data collection and preparation, Detailed system Design, Implementation, Evaluation and maintenance of MIS, Pitfalls in mis-development.

Unit III: Functional Management Information Systems

Production information system, Marketing information system, Accounting information system, Financial Information System, Personnel Information System. Inter-relationship of Functional Management Information Systems.

Unit IV: Data Base Systems

Information as a resource, meaning of Data base, Components of data base, DBMS, Data base Technology, Operations data base/Managerial Database, Comparison of DEMS, Design Principles of data base, Data base administration, Advantages and disadvantages of data base.

Unit V: Computer Power

Source and selection : Computer purchase, Computer rental from the manufacturer, Computer lease from a third party, acquisition of a used Computer, Computers, Service centres, Time Sharing Companies, Facilities management Companies, The criteria for choice, Computer System Selection, Acquiring a small business computer, Source selection.

Assignments/Practical Work:

1. Case study to obtain information relating to any business or commercial organisation.
2. Case study on information technology.
3. Case study on health issues in India.
4. Case study on cyber crime.
5. Case study on database management.

Text & Reference books:

1. SCOTT, G.M., Principles of Management Information systems, McGraw-Hill Education (1995).
2. DAVIS AND OLSON,Management Information System, McGraw Hill Education (1998).
3. LUCAS,The Analysis, Design and Implementation of information System, McGraw Hill Book Company (1998).

Course	TQM for Graphic Art Industry	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE2)

Objective: To study the total quality management used in Graphic Art Industry.

Unit 1: TQM in Graphic Industry

Introduction of TQM, definition of quality and related terms, basic elements of TQM, characteristics, advantages, holistic features, application of quality concept, quality principles

Unit II: TQM Models

TQM models -Kaizen, European Quality Awards, Malcom Baldrige Award, Indian Quality Awards, Motorola 6 sigma concepts, zero defect quality, quality circles, quality function deployment, quality by design. Quality gurus and their contribution, Deming, Crosby, Taguchi, Ishikkava, Juran.

Unit III: Statistical Process Control for TQM in Graphic Arts Industry

Statistical process control (SPC), purpose of SPC, SPC tools -process maps, Ishikawa diagrams, check sheets, Pareto analysis, histograms, run charts, contact charts, correlation diagrams, monitoring variables –X/R-chart, monitoring print attributer-P-chart, counting defects-C-chart.

Unit IV: Process Re-engineering and Sustaining Total quality

Process re-engineering, principles, requirements, steps in re-engineering, re-engineering and TQM, benefits and limitations. Corporate culture, designing total quality culture, best practices, self-assessment for total quality, total quality environment, implementation and sustaining quality.

Unit V: Certification Process

Fine tenets of continual process improvement, supplier certification process. Internal and external suppliers and customers,

analysis of present supplier and preferred supplier situation, desired outcomes of the supplier certification process, services offered by the supplier, ISO:9000 (2000), ISO:14000, QS:8000 standards.

Assignments/Practical Work:

1. To study of TQM for graphic Art Industry
2. To study of establishment of quality control in graphic industry Lab.
3. Advantages of quality control System in Industry.
4. To study about different SPC Tools.
5. Importance of ISO certification for an Industry.

Text & Reference books:

1. Herschel L.A.(1995) "Implementing TQM in Graphic Art" PiraandGATF , Pittsburg
2. Arora S.C.(1996) "Applying ISO 9000 Quality Management System" International Trade Centre,Switzerland
3. Bhat K.S.(2005) "Total Quality Management" Himalaya Publishing House,Bangalore

Course	Psychology of Printing and Packaging	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE3)

Objective: To understand the psychology of clients to boost printing and packaging work.

Unit I: An Introduction

Psychology and design in the business world (organizations that grow, study of mindset and management decisions, leadership, organizational mindset)
How to Introduce a banking concept to consumers(Learning Backgrounds, goals, process, strategy and Brand Identity)

Unit II: Working of eye and Brain

Understanding vision, Light, eye ,brain, seeing brightness
Design Process : Introduction, Procedures, Thinking, Looking, Doing and Critique
How to Inspire audience to own through design(Learning Backgrounds, opportunities, strategy, Design system)

Unit III: Understanding colors, Human response and psychopathology of everyday things:

Biological, Visual, Emotional, Aesthetic and Psychic response, How to understand human response through color channels : color that buys, color that heals etc
Psychology of geometrical shape such as Square, rectangle, circle etc

Unit IV: Design Basics

Understanding Design principles and way to achieve Unity, Emphasis and focal point, etc
Understanding Design Elements, Line, Shape/Volume, Pattern and Texture, Illusion of Space, Illusion of Motion, Value.

Unit V

Understanding psychological Design Theory:-The Von Restorff Effect, Gestalt Principles, Visceral Reactions, Dual-Coding Theory, Cost-Benefit Analysis

Ideas and approaches-introduction, process, tools, transformation, simplicity etc
Materials and their effects - Introduction, workability, material, sustainability

Assignments/Practical Work:

1. Study to Use Color as a psychological tool for Brand Identity ex. Face book, yahoo etc logo color.
2. Comparative study of advertising material in the business world.
3. Logo Design Case study for GOOGLE.
4. Understanding the various geometrical shapes and their use in today world ex. Use of paper in office as A4 with Rectangular shape rather than any other size and shape etc.
5. Understanding the use of Typography and their effect in Brand Building.
6. Design your own Logo and create a layout ex. Paper board box, magazine cover etc and obtain critique from the audience to improve the product identity.
7. To study and examine the relationship between packaging and consumer buying behavior.

Text & Reference books:

1. Colour & Human Response: Aspects of Light and Colour Bearing on the Reactions of Living Things and the Welfare of Human Beings by Faber Birren Publisher: Wiley; 1 edition (February 1, 1984) ISBN-10: 0471288640
2. Eye and Brain: The psychology of seeing by R.L. Gregory Publisher: Princeton University Press; Fifth edition (September 15, 2015) ISBN-10: 0691165165
3. Design Basics 2D and 3D – by Stephen Pentak (Author), David Lauer (Author) Publisher: Wadsworth Publishing; 8 edition (January 1, 2012) ISBN-10: 0495909971
4. Mindset: The New Psychology of Success Publisher: Ballantine Books; Rep Upd edition (December 26, 2007) ISBN-10: 0345472322
5. Visual Thinking –by Rudolf Arnheim Publisher: University of California Press; 2 edition (April 16, 2004) ISBN-10: 0520242262

Course	Computer Applications in Printing & Packaging	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE4)

Objective: Elementary knowledge of basic printing & Pre press reproduction technology, colour technology.

Unit I: Personal Computers

Labelling standards: Software applications, utilities, operating systems. Linking hardware and software, device interfaces, BIOS, device drivers. Memory- Introduction, types, Cache memory, Magnetic tape, optical disk, CCD, MBM (Magnetic Bubble Memory), Types of Printers (3D printers), Types of Scanning- 3D Scanning.

Unit II: Colour Terminology and Relationship

Hue, Value, Chroma, Brightness, Shades, Tint, Dimension of Color, Color Wheel, Color Symbolism, Cool, Warm, Color Schemes, Emotional effects of Color.

Unit III: DTP

Use and importance of computers in printing- Introduction to DTP, DTP in printing technology, Software and Hardware requirements Introduction of different DTP software, Photoshop Introduction, Exploring Photoshop Interface, Screen modes, Creating New Documents, Working with workspace, managing Palettes, Customizing preferences Color mode Working with Layers

Unit IV: Quark Express

Introduction, Use of Quark Express in News paper and Magazines, Specifying document setting, Creating and Opening Publications, Use of Palates and Controls, Positioning, Resizing, Inserting and placing text and picture, Box and line manipulations, Choosing a measurement, Adjusting Layout, Creating Columns, Grouping and Locking subject, Wrapping text around pictures and graphics, Using Libraries.

Unit V: Cost estimation of DTP

Digital image (BMP, TIF and GIF) file formats. Image compression & its types, Usage of Computers-Application of computer in printing and publishing Pre Press-DTP Packages, CTF,CTP,CTM ,S/W applications, file format, Press - CPC, Post -Press-Quality Control , Management-cost estimation, production planning, job sheet, procurement.

Assignments/Practical Work:

1. Use of different Hardware devices.
2. Study of DTP and its features, Software's used in printing & Packaging.
3. Page set-up with different sizes and margins.
4. Practice of image Capturing Devices (scanners)
5. Image and Text merging.
6. Modifications and Editing of illustrations and Text.

Text & Reference books:

1. Hardware Bible - Winn L Rosch Techmedia, ISBN-10: 8176356964, 2003
2. Desk Top Typography with QuarkXPress, Frank J. Romano, TAB Books Inc, ISBN-10: 0830630570, 1992
3. DTP by Vikas Gupta Published -Dreamtech Press New Delhi, ISBN-10: 8177229273, 2010
4. Handbook of Print media: Technologies and production methods -Helmut Kipphan, Springer, ISBN-10: 3540673261, 2001
5. A Guide to graphic print production - Kaj Johansson,Wiley Publications, ISBN-10: 0471761389, 2007
6. Adobe Photoshop CS6 Bible, Lisa Danae Dayley, Wiley, ISBN-10: 8126536209, 2012

Course	Digital Electronic Circuits	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE5)

Objective: To understand the use of electronic circuits in Printing and packaging Machines

Unit I: Fundamentals of Digital Techniques

Logic Gates and Boolean algebra: Digital signals, Review of logic gates, Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCH, Error detection and correction codes. Combinational Logic Circuits: Simplification of Boolean expression and realization using logic gates, sum of products and product of sums, Karnaugh map & variable, minimization of Boolean expressions using Karnaugh map, don't care conditions, variable entered mapping, and minimization using variable entered maps.

Unit II: Numbering Systems & Binary Arithmetic

Introduction. Symbolic number systems, Positional number system, Integer Binary number- Binary digital computers, Binary number system, Conversion between decimal and binary numbers, Hexadecimal numbers, Conversion between Hexadecimal, Binary & Decimal numbers. Fractional binary numbers- Converting binary fractions to decimal, Converting Hexadecimal fractions to decimal, Converting decimal fractions to Binary and Hexadecimal. Number System Notation. Binary Addition and Subtraction- Signed binary numbers, Complementary numbers, Two's complement mathematics. Binary multiplication & division. Binary codes- Character codes, Numeric codes, other binary codes, Error correction & detection codes.

Unit III: Arithmetic Circuits

EXOR and EXNOR gates, half adder, full adder, full subtractor, adder-subtractor, look ahead and carry; Data Processing Circuits: Multiplexers, de-multiplexers, decoders, BCD to decimal decoder, seven segment decoder, encoders, decimal to BCD encoder, parity generators and checkers.

Unit IV: Flip-Flops

AND gate latch, NOR gate latch, Review of flip-flops and their conversions.
Sequential Logic Circuits: Comparison between combinational and sequential logic circuits, shift registers, SISO,SIPO, PISO

and PIPO shift registers, D/A & A/D Converters

Unit V: D/A and A/D Converters

Variable-Resistor network, binary ladder. D/A counter. D/A accuracy and resolution, A/D counters- simultaneous conversion, counter method, continuous conversion, successive approximation method, single slope and dual slope A/D counters. Programmable logic devices: ROM, PLA, PAL, FPGA AND CPLDs. Application of digital electronic in printing & packaging.

Assignments/Practical Work:

1. To study and verify the truth table of Logic Gates
2. To realize half/full adder and half/full substractor using X-OR, basic gates and NAND gates.
3. To study and compare between combinational and sequential logic circuits
4. To study and compare the types of programmable logic devices used in printing and packaging industry.

Text & Reference books:

1. Digital Principles and Applications – Donald P Leach, Albert Paul Melvin- Publisher: Glencoe/Mcgraw-Hill; Sub edition (April 1986) ISBN-10: 0070398836
2. Digital Systems-Principles and Applications- Ronald J.Tocci Publisher: Pearson; 11 edition (July 17, 2010) ISBN-10: 0135103827
3. Digital Fundamentals- Floyd Publisher: Pearson; 11 edition (July 24, 2014) ISBN-10: 0132737965
4. An Engineering approach to digital design- Fletcher Publisher: Prentice Hall; 1st edition (February 19, 1997) ISBN-10: 0132776995

Course	Multimedia Technology	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE6)

Objective: Multimedia technology gets knowledge about Graphic and Animation, Audio, Video, HTML.

Unit I: Multimedia

Components of Multimedia, Interaction Devices, Text: Introduction and Implications of Digital Text, Font, Character Codes, Formatting Aspect Text, Hypertext and Hypermedia.

Unit II: Image and Audio

Introduction of image- representation, Acquisition, Picture display, Color and Brightness, scanning, Iconography, Basic Image Editing Steps and File format.

Introduction of Audio-Digital Audio, Sample, sample rate, Digital Audio editing and representation, pitch, Volume, Ampitude and Frequency, Audio File Format, Audio compression.

Unit III: Graphics and Animation

Design of statistical and schematic data, Cartography. Animation:-Animation principles, Types, Frame rate, Animation file formats, Introduction of Flash-Timeline, Frame based Animation, Tween-Based Animation, Layers, Action Script, File Formats.

Unit IV: Video

Video capture, Analog video vs. digital video, Video formats and standards, Video compression, Video Editing.

Unit V: HTML5, JavaScript, eBooks

Introduction HTML5: Tags, web page, Frame, Form, Table, Image and Embedding media; Introduction Java script: syntax & conventions. Creating script, Hiding the script , Variables, Expressions, Branching & Looping statements, Functions, Arrays Objects, Events & Document Object Model – on Click, on Mouse Over, on Submit, on Focus, on Change, on Blur, On Load, on

Unload, Alerts, Prompts & Confirms; Introduction of e-books: e-book reading devices, e-book reader software, applications and formats.

Assignments/Practical Work:

1. Multimedia and related component
2. Introduction of File format (Audio & Video)
3. Design of graphics & animation
4. Introduction of Flash player
5. Introduction of HTMT 5 with application & format

Text & Reference books:

1. Multimedia Technologies, Ashok Banerji
2. Multimedia: Making It Work,7/E Tay Vaughan
3. HTML the complete Reference 2014
4. HTML and CSS Thomas Powell 2016

Course	Advertising and Multimedia	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE7)

Objective: To understand the need of advertising and Multimedia in the field of Printing and Packaging

Unit I: Advertisement

Definition: concept, types, techniques, target audiences, Message, language, creativity visualization and campaign, psychology, Product, design, packaging; Layout, scripts, writing.
Case Study: Advertisement campaign for Dairy milk in India

Unit II: Advertisement Research

Methods, sampling, data analysis and representation, surveys, attitudinal research, report.
Case Study: Time magazine Europe-Subscription campaign

Unit III: Advertisement Budgeting and Media Planning

Budgeting, allocation of budget, calculating cost of various (print, electronic, web) media, media mix. Types of media. Readership, viewership (target audience), OTS, TRP, circulation.

Unit IV: Advertisement Agency and software's used

Structure and function, choosing advertisement agency, advertisement law; Photoshop, CorelDraw and open source
Case Study: 1. Logo designing for Apple and H.p. etc.
Case Study: 2. Tropicana Packaging redesign failure

Unit V: Ethics in Advertisement

Social impact of advertisement, Advertisement ethics and social responsibility Marketing-Mix and promotional mix
Case Study: Impact of advertisement on Social, Person and Kids behaviour

Assignments/Practical Work:

1. To study and observe the use of advertising agency in building brand management.
2. To study the research methodology adopted in the advertising agency.
3. To create and explain estimation method for e-Newspaper, Package and e-Book advertisement.
4. To study the Advertisement Agency and software's used.
5. To study Ethics in Advertisement.

Text & Reference books:

1. Advertising Theory & Practice-Chunawalla, Kumar, Sethia, Subramanian, Suchak Publisher HpH ISBN 9350244136
2. The Concept of Marketing-By Philip Kotler Publisher: Simon & Schuster (30 December 2000) ISBN-10: 0684860473
3. 3. Advertising and Promotion-By Belch & Belch Publisher: McGraw Hill Education; Ninth edition (1 May 2013) ISBN-10: 125902685X

Course	International Logistics and Legal Environment	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE8)

Objective: Indian Laws and Regulations Governing International Transaction, Intellectual Property Rights (IPR), Logistics Management: all aspect related to Trade and International Logistic.

Unit I: Logistics Management

Concepts, Importance, Elements of the logistic System, Marketing and logistic mix, Logistics and marketing interface. Air Transport: Air transport, Air freight, IATA, Cargo handling, Designing the International Information system, system modules – Distribution and Transportation.

Unit II: Shipping Industry

Types of ships – Shipping systems: linear, Tramp, conference, chartering, Baltic freight exchange – Shipping intermediaries: agent, forwarder, brokers and others – containerization – types of containers

Unit III: Intellectual Property Rights (IPR)

International protection for IPR- Patents and trademarks; Technology transfer, Telecommunications Environment protection and business obligations, Environmental legislation in India - environmental issues, Social issues, Business transaction and Cyber law.

Unit IV: Introduction to Legal Environment

National and International law, Legal frame work for foreign trade in India -Code and common laws and their implications to business

Unit V: Indian Laws and Regulations

Governing International Transactions: FEMA; Taxation of foreign income; Foreign Investments; Setting up offices and branches abroad; International Licensing; Franchising; Join Ventures – Restrictions on trade in endangered species and other

commodities.

Assignments/Practical Work:

1. Study of International Logistics.
2. Study of Humanitarian Logistics.
3. Study of type of shipping systems.
4. Study of Globalisation and its impacts.
5. Case study of intellectual property right
6. Study of legal environment for packaging.
7. Study of Indian Laws and Regulations.

Text & Reference books:

1. Daniels, John, Emest W. Ogram and Lee H. Redebungh: International Business, Environments and operations. 2008.
2. Lew, Julton D.M and Clive Stand brook (eds), International Trade Law and Practice, Euromoney Publications, London, 2009.
3. Schmothoff C.R: Export Trade – The Law and Practice of International Trade, 2008.
4. Motiwal OP, Awasthi HIC: International Trade – the law and practice; Bhowmik and Company, New Delhi, 2009.
5. David P, "International Logistics" Biztantra, New Delhi , 2006.
6. Donald J Bowersox Davi J Class" Logistics Management, Tata Mc.Graw Hill,New Delhi, 2008.
7. Reji Ismail,"Logistics Management" Excel Books, 2008.

Course	International Trade and Relations	Marking Scheme			Credits
		T	P	I	
BTech(PP)6		40	-	10	3 (OE9)

Objective: International Trade Policy relationship with major Trade Blocs, Globalization; and trends related printing Technology, Role of Government in India's Foreign Trade – EOU – EPZ – SEZ in India. Related to printing Industry.

Unit I: International Trade

Need and importance of international trade – Recent trends in world trade – leading players in the world – Major items traded. Evolution of International Business; Drivers of International Business; International Business and Domestic Business compared; Routes of Globalization; Geography of the world.

Unit II: India's Foreign Trade

Commodity composition and destination – India's position in the world merchandise trade and services- Balance of Payments of India. International Strategic Alliances; Nature and Scope of Strategic Alliances; Alliance Development process, making Alliance work, Economic consideration for Strategic Alliances

Unit III: India's Foreign Trade Policy

New initiatives – Export promotion – Import Policy and control – Foreign investment policy – policy framework for FDI in India. Integration between countries, Levels of Integration, Impact of Integration, Major Regional Trading Groups, European Union, European free trade association, North American Free Trade Agreement (NAFTA), The Andean Community, Mercosur.

Unit IV: India's Trade relationship with major Trade Blocs in the world

India's Trade agreements with various blocs. Association of South East Asian Nations(ASEAN), Asia-Pacific Economic cooperation (APEC), SAARC, SAPTA, SAFTA, Middle East and African Initiatives.

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Unit V: Role of Government in India's Foreign Trade

EOU – EPZ – SEZ in India. Institutional support to International Business, United Nations (UN) World Bank, Internationa. monetary Fund, UNCTAD, Asian Development Bank, WTO.

Assignments/Practical Work:

1. Study the need of International Trade.
2. Case study on Indian's foreign Trade and its policies.
3. Study of World politics.
4. Study of International Organisations.
5. Study of role of Government in India's foreign trade.

Text & Reference books:

1. Francis Cherrunilam, International Trade and Export Management, Himalya Publications, 2009.
2. Bhagvati J (ed), International Trade , Penguin Books , 2007.
3. India's Trade statistics, published by CMIE and DGCIS.
6. International Business - Charles W L Hill, Tata McGraw Hill, 2010
7. Trends in International Business - Michael R Czinkota and Masaaki Kotabe,
8. International Business - K. Aswathappa, McGraw Hill, 2010.
9. International Business - P. Subba Rao, Himalaya Publications, 2010.

Course	Print Media Ethics	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE10)

Objective: To create morality and ethical values in a print media organization.

Unit I: Morality and ethics

Introduction. Types of ethics, Nature of Ethics, Objective of ethics, Business Ethics, Business Ethics and Profits; Relationship between Business & Ethics - The Unitarian View, The Separatist View, The Integration View. Nature of Ethics in Business; Characteristics of Business Ethics; Need for Business Ethics; Arguments against Business Ethics, An example of Ethical business Practice, Discussion Situation 1;Discussion Situation2;Discussion Situation 3; Ethical Practice in Management; Evolution of Business Ethics as a field of study.

Unit II: Workplace Justice Issues

Automation - De-skilling -Safety -Working hours and tasks privacy -Information Technology Issues in the International Setting- Computer Privacy- Methods of privacy protection: Browser settings- password systems -firewalls - anonymous email (proxy) Encryption and virus protection software, and other Internet security related programs- Computer cleaning software.

Unit III: Work life In Indian Philosophy

Indian Ethos for the Work life - Man's unique inner resource, Holistic relationship between Man and Nature, Cooperation, Self-Management, Yoga and Meditation, Dharma, The spirit of Renunciation, Indian Values for the Workplace - The importance of relationships in the workplace, Respect for Elders, Respect for Hierarchy and Status, Need for Security, Simple Living and High Thinking, The Karta, Internal Orientation, Wisdom, Balance and Moderation. Rights and Duties. Quality of Work life in Indian Philosophy.

Unit IV: Overview of the Ethical Value System

The System of Universalism, The System of Utilitarianism, The System of Distributive Justice & Social Contracts, Individual Freedom of Choice, The Legal System & Professional Codes. Culture & Ethics- Social Culture & Individual Ethics-Social

Contract Theory, Collective or Socialism Theory, Organic Theory. Idealistic or Group-Mind Theory. Similarity of Ethical Values in different Cultures- The Principles, Conclusion. Case Study.

Unit V: Role of Legislation & Other Bodies in Enforcing Ethical Business Behaviour

Relationship between Law and Ethics. Role of the Government of India in enforcing ethical behaviour. The Indian Constitution; Indian Business Laws and their impact on Ethical business behaviour - (a) Business Laws & (b) Labour Laws; Conclusion. Relationship Between Ethics & Corporate Excellence- Corporate Mission Statement, Code of Ethics, Organizational Culture, Ethics & Individual Behaviour- Areas of Influence or Areas of Authority and Areas of Interest. Education without Character, Commerce without Morality, Pleasure without Conscience, Wealth without Work, Science without Humanity.

Assignments/Practical Work:

1. To study and explain role of Ethical Practice in press Management.
2. Difference in social and individual ethics.
3. To study of Workplace Justice Issues.
4. To study of Work life In Indian Philosophy.
5. To study of Role of Legislation & Other Bodies in Enforcing Ethical Business Behaviour.

Text & Reference books:

1. Business Ethics Concepts & Cases - Sadri Sorab Publisher Tata McGraw-Hill, 1998 ISBN 0074633791, 9780074633793
2. Business Ethics: Concepts and cases publisher: Pearson Education (US); 4th Revised edition (4 August 1997) ISBN-13: 978-0133508512
3. The Seven Habits of Highly Effective People: Restoring the Character Ethic (G K Hall Large Print Reference Collection) , May 1997, by Stephen R. Covey Publisher: G K Hall & Co; Lrg edition ,ISBN-10: 0783881150
4. Professional Ethics, R. Subramanian, Oxford University Press.

Course	Printing Management & Entrepreneurship Development	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE11)

Objective: It's important for New Entrepreneur person. Information for establishing new business & project and Management of Printing Industry.

Unit I: Project Management

Concept, Nature, Development Scope, Planning, Organizing, Motivating, Controlling resources, Managing timeline approaches, traditional approaches, critical chain project management, event chain management, process based management, lean project management, extreme project management.

Unit II: Entrepreneurship & process

History and evolution, Need for entrepreneurship and self-employment development, modern means of management ; Design process- morphology of design, role of a technocrat, trade cycle, production, consumption cycle, industrial policies, design of an industrial project, stages of development of the project, preparation of the project report.

Unit III: Feasibility study

Information and needs analysis, input/output analysis, translation into goals. Physical reliability, economic viability. Market survey, demand forecasting, predicting share in the market.

Unit IV: Product design and development

Physical reliability, functional aesthetic, production and economic cost aspects, value analysis, product analysis and specifications. Distribution: sales strategies, sales organization, distribution channels, after sales service

Unit V: Financial and capital requirements

Price fixation, cash flow statement, return on investment, sources of finance, execution of project and commencement of production. Organizations and institutes promoting entrepreneurship in India

Assignments/Practical Work:

1. Study of Fundamental of Project Management.
2. Study of Entrepreneurship & Process.
3. Study of importance of product designing for entrepreneurship in printing industry.
4. Study of importance of Product Design and Development
5. Study of Financial and Capital Requirement.

Text & Reference books:

1. Fundamentals of Entrepreneurship- Third Edition Paperback – June 3, 2013 by H. Nandan (Author) Publisher: PH Learning; ISBN-10: 8120347501 ISBN-13: 978-8120347502
2. Entrepreneurship Development & Management- Jose Paul, 2000 N. Ajith Kumar Published by Himalaya Publishing House ISBN-5551234023280
3. Entrepreneurship Development Programs & Practices- Jasmer Singh Saini, Published by DEEP & DEEP PUBLICATIONS (P) LTD, ISBN-978800783X

Course	Image Processing	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE12)

Objective: To study the basic image processing system with 2D technique and image segmentation with enhancement.

Unit I: Image Processing

Basic imaging processing system, image source, characteristics, image representation, hardware and software requirements.

Unit II: Two Dimensional Systems

Properties of 2D sequences and systems, 2D fourier transform 2D Z transform, 2D sampling theory. Image quantization, image perception, quality measures. Image transforms 2D-DFT, 2D-DCT, sine transform, hadamard harr, slant and KL transforms

Unit III: Image Compression

Image compression algorithms, pixel coding, PCM, run length coding, predictive techniques, DPCM, transform coding-DCT, Vector Quantization (VQ), VQ in image coding, interface coding, standards for image compression, Jpeg, Mpeg.

Unit IV: Image Segmentation

Feature extraction, edge detection, boundary extraction, region representation, moment representation, shape featuring, scene matching, image segmentation, classification techniques supervised and non-supervised.

Unit V: Image Enhancement and Restoration

Point operations, Histogram modelling, spatial operations, transform operations, image filtering and restoration, de-blurring, colour image processing. Application in character recognition, remote sensing.

Assignments/Practical Work:

1. Study of MATLAB environment – IDE, File types, etc
2. Study of MATLAB Image Processing Toolbox – Image handling, image conversion, pixcel manipulation etc
3. Image properties – histogram, image negative,
4. Image properties - enhancement, binary, etc
5. Image manipulation in frequency domain – FFT, convolution,
6. Image manipulation - filters, plots and functions,
7. Image processing - edge detection, segmentation
8. Image compression
9. Other transforms – Z, Harr, etc
10. Image restoration

Text & Reference books:

1. Jain Anil K(2005) "Fundamentals of digital image processing" Prentice hall of India Pvt. Ltd., New Delhi
2. Gonzalez R.C. and Woods R.E. (2004) "Digital image processing" Pearson Education, New Delhi.

Course	Quality Control & Supply Chain Management	Marking Scheme			Credits
		T	P	I	3
BTech(PP)6		40	-	10	(OE13)

Objective: To understand of Quality management system in Various Printing & Packaging Organization.

Unit I: Introduction to Quality Control & system

Definition of Quality, Quality control, its meaning and purpose setting up Quality Control Program, and establishing necessary System and procedures, economic consideration. Management Consideration: Quality Control as an attitude and management tool, Management of Quality control system management's responsibility, organization and personnel functions, getting everybody involved. Total Quality Control. Quality Control procedures and methods. Different shapes of quality control.

Unit II: Materials Control

Establishing clear specifications and standardization of materials to be purchased, Inspection and testing of incoming materials as part of quality control; Importance of proper handling and maintaining records of performance of materials Sampling and sampling plans. Establishing Quality control programme in different departments of Packaging Plant. Consistent with the appropriate quality level. Introduction to ISO: 9000 and ISO: 14000 series.

Unit III: Quality control programme in Printing Industry

Establishing Quality control programme in different departments of Printing organization. TQM System, 5 S System, KAIZEN system, SIX SIGMA, 7 QC TOOLS, GRACOL.

Unit IV: SCM System and Sourcing Procurement

Concept of logistics and SCM, decision phases, design, planning and operation, decision areas, type of supply chain views - flows in supply chain, supply chain and competitive performance, performance measures for SCM, strategic fit and drivers of supply chain. sourcing Procurement: factors in source selection, vendor rating, qualitative and quantitative methods, purchasing, objectives and procedure, purchasing systems, tender method, computer based systems/EDI, inventory concept –

functions of inventory, selective inventory control techniques, structure of inventory problem, costs associated with materials management, relevant costs.

Unit V: Certification & inventory Management

Introduction of ISO 9000 and ISO 14000, ISO -31000; Concept of just-in-time, KAN BAN–introduction to distribution requirement planning; different kind method or modal for inventory management.

Assignments/Practical Work:

1. Study importance of Quality control System.
2. Study TQM System and 5 S System.
3. Study of industrial certification such as ISO.
4. Study importance of SCM and its working in Industry.
5. Study certification & inventory Management

Text & Reference books:

1. Fundamentals of industrial Quality control by Lawrence S Aft. Third Edition ,Publisher CRC Press1997, ISBN-1574441515,9781574441512
2. Six Sigma Handbook by Thomas Pyzdek, 4rth Edition ,(Publisher Mc Graw-hill Education,, ISBN-13: 978-0071840538)
3. Total Quality Management(TQM) by L.Suganthi (publisher- Prentice Hall india Learning Private Ltd. ISBN-8120326555
4. E-business And Supply chain Issue in Book Publishing Industry in Asia (Conference Paper) by Leong Weng Fei, N Viswannadham (national University Singapore
5. Operation and supply chain Management by G.Srinivasan,(Publisher-Prentice Hall india ,ISBN-10- 8120339819,ISBN-13-978-8120339811)

Course	Industrial Safety and Management	Marking Scheme			Credits
		T	P	I	
BTech(PP)6		40	-	10	3 (OE14)

Objective: To introduce and acknowledge about Industrial safety from fire ,chemical, environmental or health related.

Unit I: Fire Protection and Chemical Safety

Definition of fire, elements of fire, Causes of fire, Classification of fire; spreading of fire; Method of extinguishing fire; different extinguishing medias- water, foam, dry powder, ABC Powder, CO2, Halon. Chemical risk analysis: -Flammability - vapor pressure, limits of flammability, Flash points, auto-ignition temperature. Stability: - Experimental methods of determination, classifications of instability risk; Toxicity: - Evaluation parameter, level of toxic risk, problem posed by determination of toxicity risk level.

Unit II: Safety Planning and Its Industrial Application

Effective planning for safety- Definition, need, nature, principles, policy and formulation. Safety in industries involving hazardous processes, highly flammable liquids & flammable compressed gases, safety in chemical works, application of safety in handling corrosive substances, safety audit in various types of factories, types of safety audit, its methodology and reporting.

Unit III: Laws related to Safety, Health & Environment

Factories Act 1948. The Plantation Labour Act, 1955; Environment (Protection) Act 1986, (MSIHC) Rules 1989. The Water (Prevention & Control of Pollution) Act, 1974, amended 1988; Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 amended 2000 , Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996; The Air (Prevention & Control of Pollution) Act, 1981 amended 1987, Chemical Accidents (Emergency, Planning, preparedness and response) Rules 1996.

Unit IV: Pollution Control, Solid and Hazardous waste Management

Air Pollution, Air pollution Measurement, Air quality monitoring, Air pollution control Technology & method, Equipment Selection, Equipment design, Particulate emission control; Concept of water pollution, characteristic of waste water, Solid & hazardous waste management: Sources, Waste Minimization, Hazardous Waste Transport & treatment facilities, Treatment systems for hazardous waste &handling and treatment of plant residues. Training for waste management operators.

Unit V: Environmental and Disaster management in industries

Principles & requirements of ISO 14001 EMS, Environmental auditing & Auditing of waste minimization. Environment Impact Assessment ,Environment Management Plan, EIA, EMP;OHASAS – 18001.Disaster Management-Types & consequence o major accident hazards, Role of management, Local authorities and public, Disaster Management Cycle -Preventior Mitigation, Preparedness, Disaster impact, Response, Restoration, Reconstruction.

Assignments/Practical Work:

1. To study of fire & chemical Safety methods.
2. To study about waste & hazards management in Printing industry.
3. To study of Safety Planning Management.
4. To study of Pollution Control, Solid and Hazardous waste Management.
5. To study of Environmental and Disaster management in industries.

Text & Reference books:

1. Fire and Explosion hazards Handbook of Industrial chemicals (Author - Tatyana Davletsniha , Nicholas P. cheremisin off , Publisher -Noyes Publication 1998, ISBN- 0815514298,9780815514299
2. Fundamental of Industrial safety/ and Health- Third Edition 2012(Authored By- Dr K.U Mistry, Publisher-M/S Siddhartha Prakashan, Ahmadabad.
3. Water Pollution, Causes Effects & Control by P.K. Goel (publisher–New age international 2006,ISBN 8122418392,9788122418392)
4. Waste Management by Rajiv K. Sinha,V S sexena (INA Shree Publishers, ISBN-8186653325)