UNIVERSITY OF MUMBAI
No.UG/253 of 2008

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Engineering (B.E.) degree course ***vide*** this office Circular No.UG/95 of 2004 dated 8th March, 2004 and the Principals of the affiliated colleges in Engineering are hereby informed that the recommendation made by the Faculty of Technology at its meeting held on 26th March, 2008 has been accepted by the Academic Council at its meeting held on 15th April, 2008 ***vide*** item No 4.28 and that, in accordance therewith, the scheme and syllabus prescribed for the T.E. (Sem.V and VI) Printing and Packaging Technology leading to the B.E. degree is as per **Appendix** and that the same has been brought into force with effect from the academic year 2008-2009.

MUMBAI-400 032
16th June, 2008

for REGISTRAR

To,

The Principals of the affiliated colleges in Engineering.

AC/4.28/15.04.2008

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No.UG/ 253-A of 2008, MUMBAI-400 032 16th June, 2008.

Copy forwarded with compliments for information to :-

1) The Dean, Faculty of Technology
2) The Controller of Examinations,
3) The Co-ordinator, University Computerization Center.

for REGISTRAR

Copy to :-

The Director, Board of College and University Development, , the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Personal Assistant to the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information .

The.Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section),Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education,(10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar,(PRO) . the Assistant Registrar, Academic Authorities Unit (2 copies)and the Assistant Registrar, Executive Authorities Unit (2 copies) . They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account Unit V(1 copy), the In-charge Director, Centralize

Enclosure to Item No. 4.28
15.4.2008

UNIVERSITY OF MUMBAI

Syllabus and

Scheme of Examination

For

The Third Year (Sem. V & VI)

of the

B.E. Degree Course

in

Printing and Packaging Technology

(With effect from the academic year 2008-2009)

UNIVERSITY OF MUMBAI
Scheme of instructions & Examination
at
B.E. (Printing & Packaging Technology)

Semester – V B.E (Printing & Packaging Technology)

S.No	Subjects	No. of periods per week (60 minutes each)			Duration of theory paper (hours)	Marks				
		Lecture	Practical	Tutorial		Theory paper	Term work	Practical	Oral	Total
1.	Plastic Processing & Conversion Technologies	04	02	--	03	100	25	25	--	150
2.	Prepress, Plate Making & Type Setting	04	02	--	03	100	25	--	--	125
3.	Colour Management	04	02	--	03	100	25	25	--	150
4.	Machine Design	04	02	--	03	100	25	--	25	150
5.	Digital Electronics & Microprocessors	04	02	--	03	100	25	--	--	125
6.	Presentation & Communication Skills	02	--	02	--	--	25	--	25	50
	Total	22	10	02						750

Semester – VI B.E (Printing & Packaging Technology)

S.No	Subjects	No. of periods per week (60 minutes each)			Duration of theory paper (hours)	Marks				
		Lecture	Practical	Tutorial		Theory paper	Term work	Practical	Oral	Total
1.	Product Packaging – I	04	02	--	03	100	25	--	--	125
2.	Printing Technologies - I	04	02	--	03	100	25	--	--	125
3.	Statistical Systems & Quality Assesment	03	02	--	03	100	25	--	25	150
4.	Introduction to CAD / CAM Technologies	04	02	--	03	100	25	25	--	150
5.	Electronics Instrumentation in Printing & Packaging	04	02	--	03	100	25	--	25	150
6	Industrial Visits	-	02	-	-	-	25	-	25	50
	Total	19	12	-						750

T.E (Printing & Packaging Technology)		Semester - V	
Subject: Plastic Processing & Conversion Technologies			
Periods per week 1 period of 60 min.	Lecture	04	
	Practical	02	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	--	25
	Oral Examination	--	--
	Term Work	--	25

	Detailed Syllabus	Periods	Weight
UNIT - I	Plastics processing and conversion Technologies Polymers – ~~definition~~, classification, polymerization processes, Thermoplastics & Thermosets Polymers & Plastics – properties influencing conversion Technologies, Compounding and Moster batches	10	16.6
Unit - II	Plastics conversion Technologies Extrusion process, M/c & Equipment, process of Extrusion, selection and product Cast & Blow Process & Extrusion Coating	13	21.6
Unit - III	Plastic conversion Technologies Blow process, moulds, M/c & Equipment Stretch blow and injection blow process	13	21.6
Unit - IV	Plastic conversion Technologies Injection moulding, Die, process/rotational moulding, compression moulding	12	20
Unit - V	Metallisation – vacuum and Barrier metallisation Moulds & Mould designs Screw & Screw Designs	12	20

Practicals: List of Experiments (at least 8 experiments are to be performed)
Identification of Plastics – chemical method and instrumentation method
Melt Flow Index of Resins/Granules
Degree of metallisation
Dimensional stability of converted plastics products
ESCR – test on moulded items

Term Work & Practical Examination:

Term work shall comprise of practical journal report and class test based on above syllabus. Practical Examination is based on the list of experiments mentioned above.

Term work:

Practical Journal Report	- 10 marks
Class Test	- 10 marks
Attendance	- 05 marks
Total	- 25 Marks

Text Books/References

1. H/B of Polythylene – Andrew J Peacock – Marcel Dekker – 2000
2. Compression Molding – Bruce A Davis – Hanser Gardner Publications - 2003
3. Film properties of Plastics & Elastomers, 2/e – Liesl K Massey – Plastics Design/William Andrew - 2004
4. Hand Book on Plastic Packaging – Susan E.M. Selke, John D.Culter, Ruben J Hernandez – Hanser Gardner Publications - 2004
5. Technical Booklet on Plastics – Dave – Dave Technical Services - 2006
6. Hand Book of Plastic Films – E.M.Abdel Bary – Rapra Technology Ltd. – 2003
7. Handbook of Plastic Process by Charles A.Harper, John Uitey

T.E (Printing & Packaging Technology))

Subject : Prepress, Plate Making & Type Setting			
		Semester - V	
Periods per week (1 period of 60 minutes)	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
	Total		125

	Detailed Syllabus	Periods	Weightag
UNIT - I	Basics of type setting, Elements in copy preparations, advanced type setting methods, Desktop publishing, Digitai fonts.	06	10
UNIT – II	Printing, Image Generation, Image carriers for Flexography, Gravure, Screen, Heat transfer and Digital Image	06	10
UNIT – III	Introduction to Printing plates for flexography. Plates for process printing – Moulded rubber plates – basics of rubber plate making, rubber printing plate components, and rubber plate moulding. Photo polymer plates – Basics of Photopolymer plates. Types of Photopolymers – Plate making from liquid photo polymer. Plate making from sheet photo polymer. Negative, engravings and hard durometer. Photo polymer master – preparation of metal and image exposure, powder less etching of metal, finishing, qualities of a good metal engraving, basic types of engravings, types of metal originals other originals. Moulded printing plate manufacture – moulding press, thickness control bearers, bench micrometers, and rubber plate finishing. Auxiliary equipment needed to produce printing plate. Making the thermosetting mould or matrix – Composition of matrix, shrinkage and its control, matrix requirements, matrix mould make – ready procedure for moulding a matrix. Rubber plate moulding	14	23.33
UNIT – IV	History of gravure products and markets – Publication gravure – gravure packaging and converting – product gravure. Gravure Screens, Gravure cylinder preparation – Diffusion etch – Direct transfer – Electromechanical process – Laser cutting. Electronic engraving systems today. Chemical engraving methods and equipments – cell configurations – advantages and disadvantages. Cylinder correction methods – Re-etching electro mechanical engravings, Colour balance etches, spot plating. Well	14	23.33

	formation – variables, basic types. Cylinder construction and preparation – Cylinder design, types Balancing the cylinder. Copper plating and Polishing. Re use of cylinders. Doctor blade – Doctor blade assembly – Blade angles. Blade distance from Nip, Blade edge, Blade mounting.		
UNIT – V	Prepress preparation for off set / litho process Basic principles in Planography printing and planographic plate making. The plate base – cross section of an aluminum plate, cross section of a plastic plate. Graining of plates, paper aluminum graining electrochemical graining. Anodized aluminum, plate washes. Paper plates, paper aluminum laminates, plastic plates. Light sources for plate marking – spectral data for various light sources, metal halide, and mercury lamps, pulsed – xenon, laser. Treatment of nonimage areas – desensitizing gum, chemistry of gum Arabic, other natural & synthetic gums. General processing sequence for a negative working plate. General sequence for a positive working plates. Negative working plates – additive presensitized plates, subtractive diazo PS plates. Photo polymer presensitized plates, aqueous developable plates, driographic plates, and multimetal plates. Producing a multimetal plate. Types – bimetalic, trimetalic. Projection – speed negative plates – photo direct plates – diffusion transfer plates. Screenless lithography, Laser exposed plates. Deep etch plates and their purposes. CTP, types of CTP plates, CTP architechture.	15	25
UNIT – VI	Prepress – Screen / pad preparation for screen-printing and pad printing.	05	8.33

Practicals: List of Experiments (at least 8 experiments are to be performed)	
1	Preparation of Flexo stereo
2	Bar Code / Illustration Printing
3	Experimental (Visit) to Gravure Cylinder making
4	Offset plate making
5.	Roller coding with different bars

Term Work:

Term work shall comprise of practical journal report and class test based on above syllabus.

Term work

Practical Journal Report	- 10 marks
Class Test	- 10 marks
Attendance	- 05 marks
Total	- 25 marks

TEXT/REFERENCE BOOKS

Type setting – composition - Geoff, Barlow
Introduction to prepress – High Speirs
Flexography Principles and practices – Foundation of flexographic Technology Association.
Manual for Lithography Press operation – As.Porter
Screen Printing preview – Babette Magee
Gravure Process & Technology – G.A.A.

T.E (Printing & Packaging Technology)		Semester - V	
Subject: Colour Management			
Periods per week 1 period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	--	25
	Oral Examination	--	--
	Term Work	--	25
	Total		150

	Detailed Syllabus	Periods	Weightage
UNIT - I	**Color Separation and corrections** Types of originals – transparencies – the ideal transparency – Principle of color separation –Screen angles and juxtaposition of dots – Direct – indirect methods color separation – color correction – need for color correction – Masking – Integral color printing using standard inks – digital color separation – ink color sequence – brief intro to manual retouching masking for color correction – types of Masking – positive masking – negative masking – double overlay masking – integral color masking – dye retouching – chemical correction or reduction – positive dot etching – intensification – Unsharp masking – Grey balance and Tone reproduction.	10	16.66
UNIT – II	**Color Science** Understanding color- Visual system-eyes and visual sense – structure and functioning of human eye-electromagnetic response – cones and rods – temporal properties – after image – simultaneous contrast – perceived color – understanding light – wavelength – synthesis of light – what is color? Physical – photochemical – physical properties of color – isolated colors – color temperature – spectral reflections – basic attributes of color – brightness – lightness-color terms – hue, value and chroma – basic theories of color – additive and subtractive synthesis – primary – secondary – tertiary colors – modern theory of light and color – practical interpretation of additive and subtractive color mixture.	10	16.66
UNIT – III	**Color System & Color Management** CIE – spectral reflections – - CIE color standard –	10	16.66

	standard observer – tri – stimulus values Munsell – Munsell Hue circle – CIELAB, CIELUV, Metamerism, memory color - Color management – introduction – WYSIWYG – functions of color management – color management module – color engine – functions of CMM – Principles of color management – Models of color management, RGB, HSB, ICC – colorimeter and spectrophotometer – color calibration. Color difference calculation.		
UNIT – IV	**Electronic Scanning** Introduction, development of electronic scanning, basic elements of scanners, principle of electronic scanning – basic of electronic scanning – pixels – binary – resolution – AM, FM screening – digital halftones – basic scanner types – drum CVCD flat type – PMT etc. Pantone – focaltone – trumatch – special /spot color applications of special color – digital images – sampled images – bitmap – raster – vector graphics. Scanning – automated scanning software, copy dot scanning & rescreening. Image capture elements – photo multiplier tubes, charge coupled device. Scanner adjustments, scanner, workflow, scanner resolution, scanner choice, preparing originals for scanning, types of scanners – high-end scanners. Process advantages: Desktop scanners, handheld scanners, flatbed scanners, slide scanners, video digitizers, logo scanners, pen scanners, advantages of each working. Tone adjustments – white, black point adjustments, gradation, color adjustments, automating scanner adjustments, color separation.	10	16.66
Unit - V	**Computer graphics & Image processing, Basic concepts** Introduction, The origin of computer graphics, working of interactive – graphics display, New display devices, General purpose graphics software, The user – interface, display of solid objects, line drawing, displays – Display devices and controllers, Display devices, The CRT – Electron guns, Deflection system, Phosphors, Beam penetration CRT, shadow mask CRT. Inherent – memory, devices – Direct view storage tube, Plasma panel, Laser – scan display, The storage – tube display, and The fresh line – drawing display. Two dimensional transformations, transformation principles, concatenation, matrix representations – matrix formulation of transformations, concatenation of matrix	10	16.66

	transformations, efficiency. The clipping & windowing – a line clipping algorithm, Midpont subdivision, clipping other graphic entities, polygon clipping, viewing transformations, the windowing transformation		
Unit – VI	**Print Control** Densitometry – type of densities – specular – diffuse – double density – color printing – factors in color printing – printed ink density – in trapping – tone value – additivity and proportionality failure – UCR – GCR – color control strip and punch register system – duo ones – dot area measurement – Murray Davis equation and Yule Neilson correction – Pre-press color proofing – DDCP – Inkjet – Thermal Wax – chromalin proofing – factors in proofing – substrate - color of ink – solid ink density – trapping – tone reproduction – proofing methods – soft proof – digital proof – photomechanical proof –press proof – other proofing methods	10	16.66

Practicals: List of Experiments (at least 8 experiments are to be performed)	
1	Physical properties of color
2	Spectro photometer
3	Colorimeter
4	Hand set / Desk top scanning
5.	Ink Viscosity / Ink solids
6	Ink coating - gam

Term Work & Practical Examination:

Term work shall comprise of practical journal report and class test based on above syllabus.
Practical Examination is based on the list of experiments mentioned above.

Term work:

Practical Journal Report	- 10 marks
Class Test	- 10 marks
Attendance	- 05 marks
Total	- 25 Marks

TEXT BOOKS

1. Computer Graphics Principles & Practices (2nd edition) – Van dam, Foley, Flenner Hugles
2. Digital Image Processing and Analysis – Mazumdar
3. Principles of color Reproduction – J.A.C. Yele
4. Color – Robin B. McAllistor
5. Design and Technology of Packaging decoration for the Consumer Market Gies
6. Color and the optical properties of Materials – Richard Tilley
7. Hand Book of Imaging Materials 2/e
8. Colour Engineering by Dr.Phil Green John Uiley

E (Printing & Packaging Technology)		Semester - V	
bject: Machine Design			
riods per week eriod of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
aluation System	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total		150

	Detailed Syllabus	Periods	Weightage(%)
it - I	Material properties and their uses in design	02	4
it - II	Manufacturing considerations in design Tolerances, Types of fits, selection of fits, design considerations of casting and forging	03	6
it - III	Basic principles of Machine Design, Modes of failures, factor of safety, design stresses, principle stresses, theories of failures standards, IS codes, prefereed series and numbers, Aesthetic & Ergonomic Consideration in Design	04	6
it -IV	Design against static loads For Elements i) Cotter joint, knuckle joint, strap and connecting rod ii) Bolted and welded joints under concentric and eccentric loading iii) Screw jack, screw presses iv) Brackets v) Levers	10	15
it - V	Design against Fluctuating Loads Variables stresses, reversed, repeated, fluctuating stresses Fatigue failure Static and fatigue stress concentration factors Endurance limit – estimation of endurance limit	04	05
it - VI	Design of shaft – power transmitting, power distribution shafts (excluding crank shaft) under static and fatigue criteria	05	09
it – VII	Design of keys – Taper keys, parallel keys, Gib-headed key, Woodruff key, Design of flanged coupling	06	10
it - VIII	Design of Pressure Vessels – Cylindrical pressure vessels with flat and dished ends	06	10
it - IX	Design of bolted joint – With and without gaskets under	08	15

	static and fatigue criteria		
t-X	Design of spure and Helical gears	07	15
XI	Selection of antifriction Bearings	05	05

Term Work:

Term work shall comprise of the class assignments and class test based on above syllabus.
Design and detailed assembly drawing on half imperial drawing sheets of two mechanical units, which includes the design of elements from above topics

Term Work

Class Assignments	- 10 marks
Class Test	- 10 marks
Attendance	- 05 marks
Total	- 25 marks

Use of standard design data books is permitted at the examinations and be supplied by the college.

Text Books:

- Design of machine elements by V.B. Bhandari Tata McGraw Hill Pub.
- Machine Design – An Integrated Approach – Robert L Norton – Pearson Education Asia
- Machine Design – Pandya Shah – Charotar Publishing
- Mechanical Engineering Design – J.E. Shigley – McGraw Hill
- Recommended Data Books – PSG, K.Mahadevan

Reference Books

- Machine Design – Reshetov – Mir Publication
- Machine Design – Black Adams – McGraw Hill
- Fundamentals of Machine Elements – Hawrock, Jacobson – McGraw Hill
- Design of machine Elements – VM Faires, Macmillan, NY
- Design of Machine Elements – MF Spotts, Peason Prentice Hall, NJ
- Machine Design Kinamatic, Dynamics & Design of Machinery 2nd Edition by Waldron, John Uiley

T.E (Printing & Packaging Technology)		Semester - V	
Subject: Digital Electronics & Microprocessor			
Periods per week 1 period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
Total			125

	Detailed Syllabus	Periods	Weightage
nit - I	**Number systems & Boolean Algebra:** Decimal, Binary, Octal , Hexadecimal Number System And Conversion, Binary Weighted Codes, Signed Numbers, 1s And 2s Complement Codes, Binary Arithmetic, Binary Logic Functions, Boolean Laws, Truth Table, Associative And Distributive Properties, Demorgans' Theorems, Realization Of Switching Functions Using Logic Gates.	08	14.28
nit - II	**Combinational & Sequential Logic :** Canonical logic forms, Sum of Product and Product of Sums, K-Map, two, three and four variable k-map, Simplification of expressions. Quine – Mccluskey minimization technique, Mixed logic combinational circuits, Flip flops, clocked & edge triggered Flip-flops. Timing specifications, Asynchronous & Synchronous counters, Counter design with state equations, Registers, SISO Register, Tristate Register,timing consideration.	08	14.28
it - III	**Introduction to Microprocessor :** Microprocessor Architecture and its operation. Study of 8085 Microprocessor pinout and signals. Memory organization and Memory mapping. Interfacing devices and review of I/P/O/P Devices. Latches Buffers Decoders as 74245. 74138 block diagram and working of 8085 based Microcomputer system.	08	14.28
it -IV	**Programming Concepts of Microprocessor:** Classification of Instruction. Instruction format, Instruction Timing and operation status. Program writing skills and Hand coding, Expected Execution for simple programs. Data Transfer, Arithmetic operations. Logic operations, Branch Operation Instructions, Assembly language programs and debugging	08	14.28
t - V	**Interfacing Peripherals (I/OS) and Subsequent**	08	14.28

	Peripheral devices study: Basic Interfacing Concepts. Interfacing input keyboard. Interfacing output display, study of 8279 Keyboard / display interface. Memory interfacing. Concept of I/O mapping. I / O interfacing Devices study such as 8155 and 8255. interrupts and interrupt handling. Study of Interrupt controller chip 8259. Additional I/O Concepts and ADC / DAC (8 bit only Interfacing)		
- VI	**Additional Peripheral Device and Data Communication using 8085 :** Study of 8253, Programmable Interval Timer Chip. Study of DMA controller chip 8257. Basic Concepts of serial I / O. SID / SOD the pins of 8085 and their significance. Software controlled serial I / O. Synchronous & Asynchronous Data Transfer. Hardware Controlled Serial I / O, study of programmable chip USART 8251.	08	14.28
- VII	**Microprocessor Applications In Printing & Packaging Technology:** Stepper motor drive and Controller. Floppy Disk Controller. Rolling Display using 8085, Printer Interfacing with 8085, Color Monitor Controller, Microprocessor based sequence controller. Concept of programmable logic controller with block diagram and simple programming (8 bit) related to specific printing operation sequence.	08	14.28

Practicals -List of study Experiments as per Indian Standards
Verification of Truth table for fundamental and derived gates (And, Or, Not, Nand, Nor, Ex-or, Ex-Nor)
Verification of Boolean Laws and theorems using logic gates.
Verification of Half and Full Adders and Subtractor
Study of Flip-flops : SR, D, JK,T
Write & Execute programme for 1) Addition & Subtraction; 2) Multiplication & Division using 8085.
Write & Execute programme for Code conversion decimal to binary.
Write & Execute programme for Up/Down counter
Study of Interrupt Controller 8259
Inter facing ADC / DAC (8 bit only) to 8085
Interfacing stepper motor
Study of 8255 chip and interfacing with printer

Term Work:

erm work shall comprise of practical journal report (atleast 8 experiment from the above list long with 2 assignments) and class test based on above syllabus.

erm Work

ractical Journal Report	- 10 marks
lass Test	- 10 marks
ttendance	- 05 marks
otal	- 25 marks

Text Books:

1.	R. P. Jain, " Modern Digital Electronics", TMH 2001
2.	M. Morris Mano, " Digital Design" by Pearson Education
3.	Malvino, "Digital Electronics", TMH
4.	R. S. Goankar, "Microprocessor Architecture Programming & Applications with 8085" Wiley Estern Publications
5.	Digital Electronics by A.K.Maini John Uiley
6.	Digital Design by Wakerly Pearson education 4th Edition

T.E (Printing & Packaging Technology)		Semester - V	
Subject: Presentation and Communication Techniques			
Periods per week 1 period of 60 min.	Lecture	2	
	Practical	--	
	Tutorial	2	
Evaluation System		Hours	Marks
	Theory Examination	--	--
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total		50

	Detailed Syllabus	Periods
Unit - I	**Communication in a Business Organization** Internal (upward, Horizontal, Grapevine, Problems, Solutions) External Communication, Strategies for conducting successful business meetings, documentation (notice, agenda, minutes) of meetings, Introduction to modern communication techniques (for e.g. e-mail, Internet, Video conferencing etc.), Legal & ethical issues in communication (intellectual property rights, patents)	06
Unit - II	**Advanced Technical Writing** REPORT – WRITING AND PRESENTATION: Definition and importance of reports. Qualities of Reports, language and style in reports, type of reports, formats (letter, memo, project – reports), methods of compiling data. Technical paper writing, writing Proposals. A computer-aided presentation of a project report based on technical, survey-based, reference based or campus related topic. Topics to be assigned to a group of 8-10 students. The written report should not exceed 20 printed pages.	10
Unit - III	**Interpersonal Skills** Introduction to Emotional Intelligence, Motivation, Negotiation and Conflict-Resolution, Assertiveness, Leadership, Team-building, Decision-making, Time-management	10
Unit - IV	**Interview Techniques** Preparing for job interviews, verbal and non-verbal communication during interviews. Observation sessions and role-play techniques may be used to demonstrate interview strategies	01
Unit - V	**Group Discussion** Dynamics of Group Behavior, Techniques for effective participation	01

Term Work:

The term work shall consists of at least eight assignments based on the whole syllabus duly recorded and graded.

Term Work

The distribution of term work will be as follows:

Assignment– 10 marks
Written test – 10 marks
Attendance -05 marks
Total - 25 marks

Oral Examination

oral examination is based on the computer-aided presentation of a project report and final oup discussion.

stribution of oral examination marks will be as follows:
esentation of Project Report – 20 marks
al group discussion - 05 marks

Text Books:

- Fred Luthans, 'Organisational Behaviour' McGraw Hill International edition
- Lesiker and Petit 'Report writing for Business' McGraw Hill International edition
- Hucking and olsen 'Technical Writing and Professional Communication' – McGraw Hill International edition
- Wallace and Masters'Personal development for Life and work' (workbook) Thomson learning
- Herta Murphy 'Effective Business communication' Hearta Murphy Herburtwhildebraudt – McGraw Hill

Reference Books

- Lewicki, Saunders, Minton 'Essential of Negotiation's McGraw Hill International Edition
- Hartman Lemny 'Presentation success' Thomson learning
- Kitty O Locker & Kaczmark, 'Business Communication Building Critical Skills' McGraw Hill
- Vikas Gupta: Comdex Computer Course Kit, Uiley India.
- Integrated Business Communication by Straut & Straut John Uiley
- Technical Communication: A practical Approach by Pfeiffer 6th Edition by Pearson Education

T.E (Printing & Packaging Technology)		Semester - VI	
Subject: Product Packaging - I			
Periods per week 1 period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
		Total	125

	Detailed Syllabus	Periods	Weightage
nit – I	Food Sector – A review and Food Spoilage & Preservation A review of fresh and processed foods – fruits /vegetables/cereals/grains /tea/coffee and processed foods – current production, movement/distribution system – factors affecting food quality, pre/Post Harvest handling. Food spoilage – physical, biological and chemical deterioration and preservation techniques cool, cold storage systems	08	14.28
nit – II	Food preservation Techniques – Dehydration, Heating, use of additives, Chill/Frozen storage, radiation preservation, fermentation, Pickling, smoking, salting and others.	08	14.28
nit – III	Packaging of Agri – Horticultural produce – post harvest handling, storage and distribution practices, methods and Materials used for packaging – Retail and bulk packaging systems – Relative merits and demerits. Traditional and modern types of packages.	08	14.28
nit – IV	Packaging of Meat Marine and Poultry products, classification of products, factors influencing spoilage – package and selection criteria – Plastics Films, Containers, folding board cartons, I Q F, A F D, Moulded Trays and Distribution packages.	08	14.28
nit – V	Packaging of Dairy products – Milk, Milk products, Concentrated Milk, Milk powder, ice Cream, Butter, Ghee, Cheese & others – specific properties of products – packaging requirements, package type available – pouches, thermoform packages, Metal containers, Plastic containers-types and selection criteria.	08	14.28
nit – VI	Packaging of Bread / Biscuit/Confectionery – Identification of packaging needs and package types and systems - foil based, Co-ex multiplayer based, paper board based, speciality paper, metal/plastic containers.	08	14.28

Unit - VII	Packaging of Edible oils – varieties, Quality parameters, spoilage factors – types of packaging, retail and distribution – pouches – monolayer to Co-ex to laminates, Glass – Metal - Plastics.	08	15-28

Practicals -List of Experiments (at least 8 experiments are to be performed

1. Assessment of Initial/Equilibrium/Critical Moisture levels
2. Prepackaging Concepts
3. Effect of storage conditions and product life enhancement
4. Moisture gain/loss-effect of product quality

Term Work:

Term work shall comprise of practical journal report (atleast 8 experiment from the above list alongwith 2 assignments) and class test based on above syllabus.

Practical Journal Report - 10 marks
Class Test - 10 marks
Attendance - 05 marks

Text /Reference Books

- Modern Food Packaging – I.I.P.
- Principles of Food Science, Chemical Preservation – Macmillan publication
- Food Packaging – Sacharow S & Griffer R.C.
- Principles of Food Packaging – Sacharow S & Griffer R.C.
- Food Packaging – Kadoyo.T.
- Uiley Encycopedia of Packaging Technology by Brody John Wiley
- Packaging design by KLIMCUCK John Uiley

.E (Printing & Packaging Technology)		Semester - VI	
ubject: Printing Technologies - I			
eriods per week period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
valuation System	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
	Total		125

	Detailed Syllabus	Periods	Weightage
NIT – I	**Flexographic Printing** Introduction to flexography, flexography – stereos, Flexography – the printing process, Mounting and proofing Flexography – substrates, Narrow and wide Web presses, water base flexography Developments – corrugated presses, preprinted liner presses, Ink distribution system	16	35
UNIT – II	**Offset/Lithography Printing** Introduction and general terminology, Presses (Horizontal/Vertical/C-I-C), Inking system, Dampening system, Infeed section, Dryer/chill roll, The Print process, Recent Developments	16	35
NIT-III	**Gravure Printing** History of gravure, Gravure cylinder preparation Doctor blades/Impression roller – types /functions, Gravure printing press – Typical press configurations, print process, controls on line and recent developments	16	35
UNIT – IV	**Letter Press/Printing** History, Growth and developments, Letter Press – printing process, Rotary and flat bed presses	08	14.28

Practicals – List of Experiments (at least 8 experiments are to be performed

- Effect of Ink and water on the print quality use of densitometer
- Identification of printing faults in given samples – Reasons & Remedial actions
- Masking Techniques
- Process Ink mixing – shade comparison – effect of substrate – Ink film thickness
- Study of various gravure printing M/c. Configuration
- Preparation of flexo plate and proofing

Term Work:

erm work shall comprise of practical journal report and class test based on above syllabus.

rm Work	
ctical Journal Report	- 10 marks
ass Test	- 10 marks
endance	- 05 marks
tal	- 25 marks

TEXT / REFERENCES BOOKS

1. Manual for Lithographics press operation – A.S. Porter
2. Lithographic technology – Erwin A Dennis / Olusegun Odesina
3. Flexography Principles & Practics – Foundation for Flexographic, Technical Association
4. Offset M/c II – C.S. Misra
5. Web Offset press operating – David B.Crouse
6. Gravure process and Technology GPA
7. A guide to graphical print Production by KAI Johanson

T.E (Printing & Packaging Technology)			
Subject: Statistical Systems & Quality Assessment		Semester - VI	
Periods per week 1 period of 60 min.	Lecture	3	
	Practical	--	
	Tutorial	2	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total		150

Detailed Syllabus

		Periods	Weightage
UNIT – I	Statistics: Introduction and scope – of statistics Definitions/Importance/Scope/Limitations **Collection of Data:** Introduction/objectives/scope/ units data Collection methods-primary/secondary – ,Personal interviews, Indirect oral investigation, Mailed questionnaires, preparation of questionnaire, secondary data – sources, care and precautions	05	
UNIT – II	**Data Classification:** Introduction, classification, Basis – Rules and. functions of classifications **Frequency Distribution:** Types, Classes, Meaning and importance, Tabulations and interpretation **Data Presentation:** Diagrams Vs. Graphs General rules, types of diagrams construction & Presentation and limitations	05	
UNIT – III	**Averages:** Introduction, Mean-Arithmetic, geometric mean, harmonic mean, Relationships, selection and limitations	05	
UNIT – IV	**Data Correlation:** Types/methods, error, etc. **Linear Regression Analysis:** Index Numbers and time series analysis	05	
UNIT –V	**Theory of Probability:** Random variable Probability distribution and mathematical expectation and theory of distribution	06	

UNIT-VI	**Sampling:** Theory and survey – Introduction population/Universe, principles, error (Absolute and relative, Biased unbiased) **Theory of estimation & Testing of Hypothesis:** Introduction, methods, confidence limits, hypothesis-testing, alternate methods, errors **Tests – Large sample size, Chi-Square tests:** T, F & z distribution, Criticality, applications & Relationship. Interpretation & extrapolation- methods, assumptions, various formulae (Newtons, Binomial)	10	
UNIT – VII	**Statistical Quality Control:** Introduction, uses, process, control charts, variable & controls, attributes, sampling plans methods, advantages and applications	06	

TEXT BOOKS

Term work shall comprise of practical journal, report & class test based on the above syllabus

Terms Work Marks:

Practical Journal report	- 10 Marks
Class Test	- 10 Marks
Attendance	- 05 Marks
Total	- 25 Marks

Oral examination is based on Practical journal

RFERENCE BOOKS

1. Fundamentals of Statistics – S.C. Gupta, Himalaya Publishing House
2. Statistical methods – S.P. Gupta, Sultan Chand & Sons
3. Fundamentals of Mathematical Statistics – S.C. Gupta & V.K.Kapoor, Sultan Chand & Sons
4. Statistical Analysis – Chou, Ya-lun, Holt, Rinehart & Winston. New York
5. Statistical Methods in Quality Control – Cowden, D.J., Prentice-Hall, 1957 and Asia Publishing House 1960
6. The Design of Sample Surveys – McGraw Hill Book Co.
7. An introduction to Probability. Theory and its applications – Feller. W.John Willey
8. Statistical Quality Control – Grant E.L., McGraw Hill Book Co., New York
9. The Elements of Statistical methods – King W.I., The Macmillan co., New York
10. Inroduction to Statistical Quality Control by montogomary John Uiley

E (Printing & Packaging Technology)		Semester - VI	
bject: Introduction to CAD/CAM - Computer Aided Design and Manufacturing			
riods per week eriod of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
		Hours	Marks
aluation System	Theory Examination	3	100
	Practical	2	25
	Oral Examination	--	--
	Term Work	--	25
tal			150

	Detailed Syllabus	Periods	Weightage
NIT – I	**Introduction**: The design process, The role of modeling and communication, Modeling using CAD Product life cycle & CAD / CAM, Concurrent engineering, Computer for design process, CAD System Architecture.	4	8
NIT – II	**Elements of Interactive Computer Graphics :** The design workstation & its functions, Operator input devices (Mouse, Keyboard, tracker ball and Joy stick etc.) Output devices (Printers & Plotters), two dimensional computer graphics, vector generation. The windowing transformation, Three dimensional Computer graphics, viewing transformation, Homogeneous coordinates, Perspective projection, Visual realism, Hidden line removal and hidden surface removal algorithm, light and shade ray tracing.	6	10
NIT – III	**Techniques for Geometric Modeling :** Graphic standards, The Parametric Representation of Geometry, Bezier curves, Cubic spline curves, B-Spline curves, Parametric representation of line, circle, ellipse & parabola, constructive solid geometry, Feature Based modeling, Feature recognition, Design by feature	9	16
IT – IV	**Transformation, Manipulation and Data Storage :** 2D & 3 D Transformations (Translation, Rotation and Scaling & Magnification), Concatenations, Matrix representation, Problems and object oriented programming on Transformations. Object transformation, mirror transformation, Data Structures for interactive modeling, Bill of materials from attribute data. The use of Object Orientation and associativity, Engineering data management system, Relational data base for design, Object Oriented Database, Structured Query language, Design Information Systems. Artificial Intelligence in Design, Representation of Knowledge, Knowledge base Engineering	9	16
	CAM (COMPUTER AIDED MANUFACTURING)		
	NC Technology : Introduction, basic components of	6	10

NC System, NC procedure, NC Coordinate systems and NC motion control systems, Applications, Advantages and disadvantage of NC machines.		
NC Part Programming: Introduction, the punched tape in NC, Tape coding and format, Manual pat programming.	4	8
Computer Aided NC Part Programming: Introduction, Part programmers job, Functions of a post processor, NC part programming languages, Elements of a APT language, The MACRO statement in APT, NC programming with interactive graphics.	10	18
CNC : Problems with conventional NC, CNC functions and advantages, DNC, Adaptive control, CNC programming concepts, Trends and new developments in NC including FMS.	8	14

Note: In practicals, drafting, modeling and packaging simulation exercises be conducted using any one of the tools like Autocad, Solid Edge, Nx, ProE, Verpack etc.

Term Work & Practical examination:

work shall comprise of Assignments at least one on each topic (both CAD / CAM) and class based on above syllabus. Practical Examination is based on the list of simulation exercises ioned above

Work:

gnments - 10 marks
s Test - 10 marks
ndance - 05 marks
- 25 marks

TEXT BOOKS
CAD / CAM by Ibrahim Zeid
CAD / CAM / CIM by P. Radhakrishnan
Computer Graphics by Hearn & Baker – Pearson Education.
CAD/CAM/CIM by M.P.Grover Pearson Education 1st Edition
CAD/CAM by Mcmohan & Jimmie Browne, Pearson
Computer Numerical control (machining & Turning Centers) by R.Quesada & T.Jeyapoovan, Pearson
Autocad For Engineer & Desighners by Sham Tickoo John Uiley

B.E (Printing & Packaging Technology)		Semester - VI	
Subject: Electronics Instrumentation in Packaging & Printing			
Periods per week 1 period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	--	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total		150

Detailed Syllabus		Periods	Weightage
Unit - I	**Basic Concepts of Measurement :** Measurement sys, classification of sys as electronic, pneumatic , hydralic, open loop, closed loop sys, Basic char of measuring devices, Types of errors, servomechanism.	10	16.66
Unit - II	**Transducers :** Transducers, Classification and selection of transducers, Transducers for measurement of displacement strain, vibration, temperature, flow, pressure, level, PH, humidity Optical devices : LDR, Photodiode, Phototransistor, Opto Coupler & LASER. Applications of transducers in Printing & Packaging.	10	16.66
Unit -III	**Data Acquisition System :** Signal conditioning, amplifiers, instrumentation amplifiers, filters, linearisation, sample and hold circuit, Analog digital DAS Multi-channel DAS, Microprocessor and Computer based system.	10	16.66
Unit - IV	**Process control :** Elements of Control System, Degree of Freedom, Process Characteristics, Control System Parameters. **Controller modes:** Discontinuous , Continuous and composite mode. Basic Block Diagram of final control operation	10	16.66
Unit - V	**Analog Controllers :** Electronic controller, Pneumatic controller, Microprocessor based temperature and flow control system computer based control Application in Printing & Packaging.	10	16.66
Unit - VI	**Programmable logic Controllers :** Architecture of PLC: Input Module, Output module, processor, memory unit. Advantages of PLC over relay logic control, ladder diagram Programming for bozle filling plant tank level control, washing machine Control applications of PLC in Printing & Packaging Data logger, SCADA	10	16.66

Laboratory study Experiments	
1.	Flow measurement
2.	Temperature measurement
3.	Instrumentation amplifier
4.	Study of photo device
5.	Pressure measurement
6.	Study of High-pass and Low-pass filters
7.	Verification of ON / OFF control actions using op – amps
8.	PID controller action on a process
9.	PLC
10.	PC based printing process control

Term Work:

erm work shall comprise of practical journal report (atleast 8 experiment from the above list longwith 2 assignments) and class test based on above syllabus.

erm Work

ractical Journal Report	- 10 marks
lass Test	- 10 marks
ttendance	- 05 marks
otal	- 25 marks

RFERENCE BOOKS

1.	Principles of Industrial Instrumentation - Patranbis
2.	Instrumentation devices and systems - Rangam, Sarma, Mane
3.	Process control Instrumentation technology – C. D. Johnson
4.	Instrumentation for Engineering measurements by Dally John Uiley
5.	Moden Electronic Instruments and measurement techniques by Heifrick Pearson Education
6.	Elements of Electronic Instrumentation & Measurement Third Edition by Carr Pearson Education

T.E (Printing & Packaging Technology)		Semester - VI	
Subject: Industrial Visits			
Periods per week 1 period of 60 min.	Lecture	--	
	Practical	2	
	Tutorial	--	
Evaluation System		Hours	Marks
	Theory Examination	--	--
	Practical	--	--
	Oral Examination	--	25
	Term Work	--	25
	Total		50

Industrial Visits

Students are expected to understand various processes in Packaging & Printing industries listed below:

- Paper Manufacturing and Paper Bags/Pouch Making
- Corrugated Board / box manufacturing
- Folding Cartons (Die cutting and folding gluing operations)
- Conversion Process – Tin Plate containers /Cans/ drums/closures
- Aluminium Hot/cold rolling, forming of foils and tubes
- Plastics Thermo forming, blow moulding, co-extrusion, form -fill –seal machines
- Glass forming process,container making
- Cushioning, adhesives, labeling, strapping
- Desktop publishing, photography, platemaking, scanners
- Offset Printing, Letter press, Flexography, Gravure, Screen Printing/ Pad Printing
- Binding & Finishing operations

Term Work & Oral Examination

Term work shall comprise of a detailed report based on Industrial Visits. Oral Examination is based on term work.

Term Work Marks:

Practical Journal Report	- 10 marks
Class Test	- 10 marks
Attendance	- 05 marks
Total	- 25 marks