

University of Mumbai



No. AAMS(UG)/ 15 of 2022-23

CIRCULAR:-

Attention of the Principals of the Affiliated Colleges, Directors of the Recognized Institutions in Faculty of Science & Technology is invited to this office circular No. UG/45 of 2021 dated 21st January, 2021 relating to the Scheme (Sem. III to VIII) and revised syllabus (Rev-2019 'C' Scheme) for the B.E. in Printing & Packaging Technology (Sem. III & IV).

They are hereby informed that the recommendations made by the Board of Studies in Mechanical Engineering at its meeting held on 19th November, 2021 and subsequently passed by the Board of Deans at its meeting held on 27th December 2021 vide item No. 6.7 have been accepted by the Academic Council at its meeting held on 28th December, 2021 vide item No. 6.7 and that in accordance therewith, the reduced syllabus for B.E. (Printing & Packaging Technology) (Rev-2019 'C' Scheme) for Direct Second Year (Sem.III) as Direct Second Year (DSE) students admission is delayed by the six months due to COVID-19 situation, has been brought into force with effect from the academic year 2021-22 only. (The same is available on the University's website www.mu.ac.in).

MUMBAI – 400 032

4th May, 2022

To

(Sudhir S. Puranik)
REGISTRAR

The Principals of the Affiliated Colleges, and Directors of the Recognized Institutions in Faculty of Science & Technology.

A.C/6.7/28/12/2021

No. AAMS(UG)/ 15 -A of 2022-23

4th May, 2022

Copy forwarded with Compliments for information to:-

- 1) The Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies Mechanical Engineering,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Director, Department of Information & Communication Technology,
- 6) The Co-ordinator, MKCL.

(Sudhir S. Puranik)
REGISTRAR

Copy for information and necessary action :-

1. The Deputy Registrar, College Affiliations & Development Department (CAD),
2. College Teachers Approval Unit (CTA),
3. The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),
4. The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA)
5. The Deputy Registrar, Research Administration & Promotion Cell (RAPC),
6. The Deputy Registrar, Executive Authorities Section (EA)
He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
7. The Deputy Registrar, PRO, Fort, (Publication Section),
8. The Deputy Registrar, Special Cell,
9. The Deputy Registrar, Fort Administration Department (FAD) Record Section,
10. The Deputy Registrar, Vidyanagari Administration Department (VAD),

Copy for information :-

1. The Director, Dept. of Information and Communication Technology (DICT), Vidyanagari,
He is requested to upload the Circular University Website
2. The Director of Department of Student Development (DSD),
3. The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,
4. All Deputy Registrar, Examination House,
5. The Deputy Registrars, Finance & Accounts Section,
6. The Assistant Registrar, Administrative sub-Campus Thane,
7. The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,
8. The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,
9. P.A to Hon'ble Vice-Chancellor,
10. P.A to Pro-Vice-Chancellor,
11. P.A to Registrar,
12. P.A to All Deans of all Faculties,
13. P.A to Finance & Account Officers, (F & A.O),
14. P.A to Director, Board of Examinations and Evaluation,
15. P.A to Director, Innovation, Incubation and Linkages,
16. P.A to Director, Department of Lifelong Learning and Extension (DLLE),
17. The Receptionist,
18. The Telephone Operator,

Copy with compliments for information to :-

19. The Secretary, MUASA
20. The Secretary, BUCTU.

UNIVERSITY OF MUMBAI



Bachelor of Engineering (Printing and Packaging Technology)

**Direct Second Year (Sem. III) Admitted Students for the
current Academic Year 2021-22 Only due to Covid
Pandemic**

(REV- 2019 'C' Scheme) from Academic Year 2019 – 20

**Under
FACULTY OF SCIENCE & TECHNOLOGY**

Program Structure for Second Year Engineering
Semester III & IV
UNIVERSITY OF MUMBAI
(With Effect from 2020-2021)
Semester III

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total	
PPC301	Engineering Mathematics – III	3	--	1	3	--	1	4	
PPC302	Packaging Introduction and Concepts	3		--	3		--	3	
PPC303	Introduction to Printing Technology	3	--	--	3	--	--	3	
PPC304	Paper based Packaging Materials	3	--	--	3	--	--	3	
PPC305	Glass, Metal and Textile based Packaging Materials	3	--	--	3	--	--	3	
PPL301	Principles of Graphic Arts and Design I	--	3	--	--	1.5	--	1.5	
PPL302	Screen Printing Laboratory	--	4	--	--	2	--	2	
PPSBL301	Packaging Material Testing - I	--	3	--	--	1.5	--	1.5	
PPPBL301	Mini Project – 1 A	--	4 ^{\$}	--	--	2	--	2	
Total		15	14	1	15	07	1	23	
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract/oral	Total
		Internal Assessment			End Sem. Exam	Exam. Duration (in Hrs)			
		Test1	Test2	Avg.					
PPC301	Engineering Mathematics – III	20	20	20	80	3	25	--	125
PPC302	Packaging Introduction and Concepts	20	20	20	80	3	--	--	100
PPC303	Introduction to Printing Technology	20	20	20	80	3	--	--	100
PPC304	Paper based Packaging Materials	20	20	20	80	3	--	--	100
PPC305	Glass, Metal and Textile based Packaging Materials	20	20	20	80	3	--	--	100
PPL301	Principles of Graphic Arts and Design I	--	--	--	--	--	25	25	50
PPL302	Screen Printing Laboratory	--	--	--	--	--	50	--	50
PPSBL301	Packaging Material Testing - I	--	--	--	--	--	25	25	50
PPPBL301	Mini Project – 1 A	--	--	--	--	--	25	25	50
Total		--	--	100	400	--	150	75	725

\$ indicates work-load of Learner (Not Faculty), for Mini Project

PBL – Project Based Learning

SBL – Skill Based Laboratory

Course Code	Course / Subject Name	Credits
PPC 301	Engineering Mathematics - III	3 + 1

Pre-requisite:

- 1) Engineering Mathematics-I
- 2) Engineering Mathematics-II

Objectives:

1. Study the concept of Laplace Transform and its applications in engineering
2. Understand the fundamental aspects of vector calculus and matrices
3. Study the concept of and complex variables

Outcomes: Upon successful completion of this course, the learner will be able to.....

1. Obtain Laplace Transform using standard results and shifting theorem.
2. Obtain Inverse Laplace Transform using Convolution theorem
3. Determine eigenvalues and eigenvectors of a matrix and using them to diagonalize a matrix
4. Determine the diagonal form of a matrix
5. Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem
6. Determine whether a given function is analytic and find its derivative.

Module	Details.	Hrs.
1	Laplace Transform: Laplace Transform of standard functions, Properties (Linearity, Change of scale) First shifting theorem (without proof), Laplace Transform of derivatives, $L\left[\frac{f(t)}{t}\right]$, $L[t^n f(t)]$, $L\left[\int_0^t f(u)du\right]$ Self-Learning Topics Heaviside Unit Step Function, Second shifting theorem	08
2	Inverse Laplace Transform: Inverse Laplace Transform by using partial fraction method, Convolution theorem Self-Learning Topics Application of Laplace Transform to solve ordinary differential equations	06
3	Matrices: Eigen values and Eigen vectors, properties (without proof), Caley Hamilton Theorem (only statement) and its applications. Diagonalization of a matrix. Self-Learning Topics Verification of Caley Hamilton Theorem.	08
4	Vector Calculus: Irrotational and Solenoidal vectors. Line integrals – definition and problems. Green's theorem (without proof) in a plane. Self-Learning Topics Scalar and Vector Point function, Vector differential operator. Gradient, Divergence and Curl. Verification of Green's theorem	08
5	Complex Variable: Functions of complex variable, Analytic functions, necessary and sufficient condition for a function to be analytic (without proof), Harmonic functions Self-Learning Topics Cauchy Riemann Equation in Polar form, Orthogonal trajectories	06

Assessment:

Term Work:

General Instructions:

- 1) Batch wise tutorials are to be conducted. The number of students per batch should be as per University pattern for practical.
- 2) Students must be encouraged to write at least 6 class tutorials on entire syllabus.

A group of 4-6 students should be assigned a self-learning topic. Students should prepare a presentation/problem solving of 10-15 minutes. This should be considered as mini project in Engineering mathematics. This project should be graded for 10 marks depending on the performance of the students

The distribution of Term Work marks will be as follows –

1	Attendance (Theory and Tutorial)	05 marks
2	Class Tutorials on entire syllabus	10 marks
3	Mini project	10 marks

Internal Assessment for 20 marks: Consisting Two Compulsory Class Tests First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I). Duration of each test shall be one hour.

End Semester Examination: Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

References:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publication
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited,
3. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa publication,
4. Vector Analysis, Murray R. Spiegel, Schaum Series
4. Complex Variables and Applications, Brown and Churchill, McGraw Hill education

Course Code	Course / Subject Name	Credits
PPC302	Packaging Introduction and Concepts	3

Objectives:

1. Study the basic concepts of packaging technology.
2. Understand marketing as an integral tool to packaging.
3. Recognize the importance of product-package interaction and its quality aspects in packaging.
4. Study the overall perspective of the packaging industry.

Outcomes: Upon successful completion of this course, the learner will be able to.....

1. Effectively observe and compare the different package forms.
2. Describe the importance of compatibility studies and their associated parameters.
3. Analyze the various hazards and environmental issues related to Packaging.
4. Analyze the aesthetics of a package and the differentiating factors.
5. Elaborate the importance of quality in packaging.
6. Explain significance of packaging in terms of today's market.

Module	Details.	Hrs.
1	Packaging Introduction: Packaging – History, Need and Evolution; Packaging Functions – Contain, Preserve, Protect, Inform, Identify, Sell; Packaging Hazards, Packaging Classifications. Importance of Packaging in Supply Chain	4
2	Packaging as a Marketing Tool: Market Considerations – Importance of Demography and Psychography, Retail Market (POP), Equity and Brand Name; Package Embellishment – Graphic Design Elements; Shelf Appeal Studies - Recall Questioning, Focus Group, Eye-Tracking, S-scope studies.	4
3	Product-Package Compatibility Studies: Product Characteristics: Physical (nature, shape, size, texture, Centre of gravity, etc.), Chemical, Biological and Effect of moisture, oxygen and other gases; Package Characteristics: Material, Physical, Chemical, Biological, Permeability. Live Problems / Case Studies.	6
4	Introduction to Quality: Quality Control and Quality Assurance - Significance in packaging; Role of specifications in defect free packaging; Significance of Testing; Introduction to Standards, Conditioning, Sampling; Read & understand the standards & their revisions and Examples; Certification for product safety and quality	4
5	Packaging Perspectives: Packaging Costs – Various elements of costing; Packaging – Environmental considerations and waste management; Introduction to Packaging Laws and Regulations; Packaging Scenario – World and India – Comparison, Scope and Growth in India.	3

Theory Examinations:

a) End Semester Examination: Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

b) Internal Assessment for 20 marks:

Consisting Two Compulsory Class Tests First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I). Duration of each test shall be one hour.

References:

- a. Soroka W., “Fundamentals of Packaging Technology”, 3rd Ed, IoPP, 2002.
- b. Paine F. A., “The Packaging User’s Handbook”, 1st Ed, Blackie Academic & Professional, 1991.
- c. Byett J. et al., “Packaging Technology”, 2nd Ed, The Institute of Packaging (SA), 2001.
- d. Selke, S. E. M., Culter, J. D. and Hernandez, R. J., “Plastics Packaging: Properties, processing, Applications and Regulation”, Carl Hanser Verlag, USA, 2004.
- e. Joseph F. H, Robert J. K, Hallie F, “Handbook of Package Engineering”, Third Edition, Technomic Publishing, 1998.
- f. Yam K. L., “The Wiley Encyclopedia of Packaging Technology”, Third Edition, Wiley, 2009.

Course Code	Course / Subject Name	Credits
PPC303	Introduction to Printing Technology	3

Objectives:

1. Introducing concepts of printing technology along with its evolution and necessity in today's society.
2. Understand the basic principles of various Printing processes.
3. Study basic image reproduction process, contribution of various elements in designing and typesetting.
4. Study of various materials used in printing processes.

Outcomes: Upon successful completion of this course, the learner will be able to

1. Distinguish various printing principles like planography, intaglio and relief.
2. Compare the process of image generation based on typography, reprography and layout making.
3. Analyze the various Press configurations of Offset, Gravure, Flexography and Letterpress.
4. Classify Inks and Substrates used in various Printing technologies.
5. Recognize various materials used in printing operations and distinguish Print finishing operations.
6. Choose an appropriate Printing process for any given Printing job.

Module	Details.	Hrs.
1	Introduction Printing – History, Need and Evolution. Definition of Printing- Various forms of communication- Conventional Printing & Digital Printing processes	02
2	Pre-Press Typography, Typesetting Original and its types Films Types of films, generation of positive and negative films, line and half tone film generation, latent image formation and development. Exposure – definition, types, effect of over and under exposure on films. Need of color separation, Additive and subtractive color theories. Layout and imposition- need and significance of imposition technique. DTP Introduction to DTP. Proofing technique: press proofers- offset, flexography, and gravure. Digital proofers.	06
3	Press Letter press printing technology- Flat bed, Platen press, Rotary Press and its applications. Offset- Sheet fed and Web fed machines- Inline, Stack, CIC and Perfecting mechanism and its applications. Gravure and Flexography- Inline, Stack and CIC Configurations and its applications in Package Printing. Screen printing. Hybrid press and its application in Packaging Industry. Introduction to Security features in Printing	06
4	Post Press Cutting, slitting, trimming. Binding, gathering, collating, inseting. Binding style-saddle stitching, section binding, perfect binding. Finishing- Die-cutting, Foil stamping, Embossing, Coating, Varnishing and Lamination	03

5	Ink and Substrate Classification of ink- paste, liquid. Basic ingredients of inks pigment resin, vehicle, additive etc. Printing inks-Rheological properties of inks,Drying methods-Chemical drying, Physical drying. Substrates used in Package printing-Standard paper sizes-British and ISO. Basic properties of Paper, Paperboard, Plastic and Foils and their importance in Package Printing	04
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Theory Examinations:

a) End Semester Examination: Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

b) Internal Assessment for 20 marks:

Consisting Two Compulsory Class Tests First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I). Duration of each test shall be one hour.

References:

1. Handbook of Print Media, Helmet Kipphan, Springer Publications
2. Handbook of Print and Production – Michael Barnard, John Peacock.
3. Printing Materials Science and Technology Vol. 24, J. Anthony Bristow
4. The Complete technology book on Printing Inks, Asia Pacific Business Press
5. Typesetting – Composition – Geoff, Barlow
6. Handbook of Typography – Kailas Tahle
7. Printing Technology 5th edition, Michael Adams
8. The Print and Production manual, PIRA

Course Code	Course / Subject Name	Credits
PPC 304	Paper based Packaging Materials	3

Objectives:

1. Gain the basic knowledge of pulping and paper making process.
2. Study the different types of paper-based packages and their manufacturing process.
3. Understand the designing process and estimation of material requirements for major forms of paper-based packaging
4. Study the major testing standards and properties of paper-based packaging materials as per standards

Outcomes: Upon successful completion of this course, the learner will be able to.....

1. Explain the raw materials involved in pulping and paper making process.
2. Explain the operations involved in pulping and paper making process
3. Identify the manufacturing process for different types of paper-based Packages.
4. Design and estimate material requirements for major forms of paper-based packaging.
5. Test and analyze the major properties of paper-based packaging materials.
6. Describe the manufacturing process for different types of paper-based Packages.

Module	Details.	Hrs.
1	Raw Materials and Preparation: Fibrous raw materials, Wood structure and morphology, Non-wood fibers and recycled paper, Non fibrous Additives, Sizing Agents, Binders, Fillers and Additives, Wood harvesting, logging, sorting, Debarking, Chipping, Screening and Storage. Pulping: Types- & Processing of pulp for paper making.	03
2	Paper Making: Preparation of pulp – Repulping/dispersion, Beating and Refining, Bleaching, Recycled paper – Deinking, Washing and Flotation Fourdrinier Paper Machine- Dry and Wet end operations- Surface treatments- Sizing, Coating and Super calendaring. Board making: Multiply Board, Cylinder Forming machine, Vat types - Pressure and suction forming. Pressing, drying and finishing.	05
3	Paper properties: Optical properties – Colour, brightness, smoothness, gloss, opacity and rub resistance, Strength properties–thickness, grammage, tensile, tear, bursting strength, stiffness, Grain direction, Wire and Felt sides	02
4	Types of papers: Printing grades-uncoated papers, coated papers, Newsprint, office paper-Packaging paper grades, properties and applications - Tissue, Parchment, greaseproof, glassine, wet strength paper, stretchable paper, coated paper- Boards used in packaging- Solid bleached/unbleached, folding box board, white lined chip board.	05

	Paper based packaging: Paper bags and Sacks–Manufacturing and Applications- Types of bags- Multiwall Paper bags – Composite containers Manufacturing and Applications Fiber drums- Regenerated Cellulosic films.	
5	Cartons and Boxes: Folding Cartons – Styles and Applications- Designing and manufacturing Set up – Creasing and Cutting operations - Box applications. Corrugated Fiber Board(CFB) - Types of flutes and their characteristics - Manufacturing process of CFB- Properties and Significance of starch glue and Making of CFB box- Styles of boxes- Calculation on weight of box of various styles. Solid Fiber board box manufacturing, materials, and applications- Moulded pulp board – moulding process, applications	06

Theory Examinations:

a) End Semester Examination: Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

b) Internal Assessment for 20 marks:

Consisting Two Compulsory Class Tests First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I). Duration of each test shall be one hour.

References:

1. Hand book of Paper and Board, Herbert Holik, Wiley-VCH, 2006.
2. Paper and paperboard Packaging Technology, Mark J. Kirwan, Blackwell Publishing, 2005.
3. Handbook of Pulp Vol.1, Herbert Sixta, Wiley-VCH, 2005.
4. Handbook for pulp and paper technologists, G.A. Smook, Angus Wilde Publications, 2001.

Course Code	Course / Subject Name	Credits
PPC 305	Glass, Metal and Textile based Packaging Materials	3

Objectives:

1. Understand the use and application of primary packaging materials i.e. glass and metal.
2. Study the types of textile materials and their application
3. Learn the basics package forms and the technology to manufacture them for the above listed materials.

Outcomes: Upon successful completion of this course, the learner will be able to.....

1. Describe and interpret the various manufacturing process for glass bottles, metal cans and tubes and textile-based bags.
2. Explain various design aspects for various types of package forms made up of glass.
3. Explain various design aspects for various types of package forms made up of metal.
4. Summarize the aerosol technology and its wide application in packaging.
5. Discuss various quality control and testing procedures for these package forms.
6. Describe the basics of fabric and textile technology to produce bags of various materials like jute, hemp etc.

Module	Details.	Hrs.
1	Glass in Packaging Introduction and History of Glass Materials - Composition - Chemical Structure - Glass properties - Glass Industry - Market Overview - Glass Manufacturing Process Types of Glass - Types of glass containers - Advantages and Disadvantages - Applications	04
2	Glass Design and Testing Glass bottle design - Specifications and Quality Control - Defects Standards for Testing: Glass - Alkalinity, verticality test, Annealing defects, dimensions and capacity along with its significance, melting point of glass, thermal shock, chemical resistance, constituents testing etc.	03
3	Metals in Packaging - I Important Metals in Packaging and their properties - Market and Industry Overview Aluminium based: Conversion processes for Sheets - Aluminium Foil, properties and their applications Steel based: Stainless and Galvanized Steel - Coated steels like Tinplate, Tin-free Steel, Polymer coated - Manufacturing Process and Description Metal Cans: History of Metal Cans – Three-piece and Two-piece Cans - Types Cans - Welded and Seamless Cans - Can Dimensioning - Specifications and Quality Control – Defects	05
4	Metals in Packaging - II Collapsible Tubes - Manufacturing process - Design of Metal Collapsible Tubes - Advantages and Disadvantages of Metal Collapsible tubes	06

	Aerosol Containers - Classification of Aerosols - Design Features - Components - Filling Process - Advantages and Disadvantages of Aerosols - Applications Overview of metal corrosion and anticorrosion techniques Standards for testing: Metal - Coating thickness, Scotch Tape test for tin lacquers, lacquer curing test for metals, rust resistance, salt drop test for corrosion etc.	
5	Textile based Packaging Materials for textile-based packaging - Raw materials like Jute, Hemp etc. - Terminologies - Sack Manufacturing Process - Jute Bag classification like Hessians, Tarpaulins and Twilled - Significance - Applications - Comparison with Plastic Bags Textile - Weight of Hessian, Properties Woven and Nonwoven plastics bags	03

Theory Examinations:

a) End Semester Examination: Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks
2. Question 1 will be compulsory and should cover maximum contents of the curriculum
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four questions need to be solved.

b) Internal Assessment for 20 marks:

Consisting Two Compulsory Class Tests First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I). Duration of each test shall be one hour.

References:

1. K. L. Yam, The Wiley Encyclopedia of Packaging Technology, 3rd ed., Wiley, 2009
2. W. Soroka, Fundamentals of Packaging Technology, 4th ed., IoPP, 2009
3. J. F. Hanlon, Handbook of Package Engineering, 3rd ed., CRC Press, 1998
4. F. A. Paine, The Packaging User's Handbook, Springer, 1990

Course Code	Course / Subject Name	Credits
PPL301	Principles of Graphic Arts and Design-I	1.5

Objectives:

1. Study the basics of how to create a design.
2. Understand the fundamental principles of graphic design and their types.
3. Study the concept of colour and their effects on design.
4. Understand the method to create visual image and layout.
5. Learn and understand the various software used for designing.

Outcomes: Upon successful completion of this course, the learner will be able to

1. Create a design based on specific requirement.
2. Analyze the usage of particular colour and text in Package design.
3. Generate various design layouts with proper visual impacts.
4. Create a design for folding carton with appropriate software.
5. Edit an image and use it in a Package design.
6. Generate Logos for a given concept or product.

Term Work: (Comprises both a & b)

a) List of Experiments:

Sr. No.	Details
1	To create thumbnails and rough sketches for logos, visiting cards as well as stationery design using Corel DRAW
2	To prepare a brochure using Corel DRAW
3	To create a label design for any given product using Corel DRAW
4	To create a design layout for folding carton of given dimensions using Corel DRAW
5	To create step and repeat (ups) using Corel DRAW
6	To create a social media ad newspaper ad using Corel DRAW
7	To cut-out an image using Adobe Photoshop
8	To apply various effects on the image using Adobe Photoshop
9	To used curves on image using Adobe Photoshop

b) Mini-Project: A group of 4-6 students should be given a design assignment. This should be considered as mini project in PGAD-I. This project should be graded for 10 marks depending on the performance of the students

The distribution of Term Work marks will be as follows –

1	Attendance	05 marks
2	Laboratory Work	10 marks
3	Mini project	10 marks

End Semester Practical/Oral Examination (for 25 marks): Under single head of examination, including Practical (15 marks assessment) followed by oral (10 marks assessment) to be conducted by internal and external examiners.

Course Code	Course Name	Credits
PPL302	Screen Printing Laboratory	2

Objectives:

1. Introduce the concept of screen-printing techniques.
2. Understand the screen-printing technology for four color printing.
3. Gain knowledge about different applications of screen printing.

Outcomes: Upon successful completion of this course, the learner will be able to....

1. Prepare screen printing image carrier by direct, indirect photographic methods.
2. Demonstrate the use of different photographic films for mesh preparation according to image.
3. Produce different printed samples for various substrates like fabric, glass, acrylic, wood by selecting suitable inks and coatings for that material.
4. Produce and analyze a halftone dot image generated for four color printing and registration of color.
5. Analyze the common faults in Screen Printing Process

Term Work: (Comprises both a & b)

a) List of Experiments:

Sr. No.	Details
1	Screen preparation and printing by direct method.
2	Screen preparation and printing by indirect method.
3	Screen preparation and printing by direct indirect method.
4	Printing two colour image on paper and textile.
5	To Planning, Designing and Production of 16 page brochure using screen printing.
6	Screen Printing on textile/PVC/Glass – T-Shirt.

b) Mini Project: A group of 4-6 students should be assigned a mini project on Screen Printing. This project should be graded for 10 marks depending on the performance of the students

The distribution of Term Work marks will be as follows –

1	Attendance	05 marks
2	Laboratory Work	10 marks
3	Mini project	10 marks

Course Code	Course Name	Credits
PPSBL301	Skill Based Lab: Packaging Material Testing - I	1.5

Objectives:

1. To understand various standards w.r.t testing of paper, paper board and plastic films.
2. To understand the difference in physical properties of paper and plastics used in packaging.

Outcomes: Upon successful completion of this course, the learner will be able to....

1. Check grammage and thickness of paper, paper board and plastic films.
2. Find out water absorption capacity of paper / board.
3. Perform strength tests related to Stiffness, Burst, Puncture and Tear.
4. Evaluate the strength characteristics of paper and plastic films.
5. Analyse the plies in a CFB and identify its flute type.
6. Evaluate the strength of a CFB.

Term Work: (Comprises both a & b)

a) List of Experiments :

Sr. No.	Details
1	To find Tearing Strength of paper.
2	To find Stiffness of board.
3	To Identify flute types and dimensions of CFB.
4	To find individual grammage of CFB plies.
5	To find Box Compression strength of a CFB
6	To find RCT of paper and ECT of CFB
7	To perform tensile strength on paper and plastic films.
8	To perform Dart Impact Test on Plastic Films.
9	To find the specular gloss of plastics / paper / paperboard.

b) Mini Project: A group of 4-6 students should be assigned a mini project on various aspects of Packaging Material Testing. This project should be graded for 10 marks depending on the performance of the students

The distribution of Term Work marks will be as follows –

1	Attendance	05 marks
2	Laboratory Work	10 marks
3	Mini project	10 marks

End Semester Practical/Oral Examination (for 25 marks): Under single head of examination, including Practical (15 marks assessment) followed by oral (10 marks assessment) to be conducted by internal and external examiners.

Course Code	Course Name	Credits
PPPBL301	Mini Project 1A	2

Objectives

1. To acquaint with the process of identifying the needs and converting it into the problem.
2. To familiarize the process of solving the problem in a group.
3. To acquaint with the process of applying basic engineering fundamentals to attempt solutions to the problems.
4. To inculcate the process of self-learning and research.

Outcome: Learner will be able to...

1. Identify problems based on societal /research needs.
2. Apply Knowledge and skill to solve societal problems in a group.
3. Develop interpersonal skills to work as member of a group or leader.
4. Draw the proper inferences from available results through theoretical/ experimental/simulations.
5. Analyse the impact of solutions in societal and environmental context for sustainable development.
6. Use standard norms of engineering practices
7. Excel in written and oral communication.
8. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
9. Demonstrate project management principles during project work.

Guidelines for Mini Project

- Students shall form a group of 3 to 4 students, while forming a group shall not be allowed less than three or more than four students, as it is a group activity.
- Students should do survey and identify needs, which shall be converted into problem statement for mini project in consultation with faculty supervisor/head of department/internal committee of faculties.
- Students shall submit implementation plan in the form of Gantt/PERT/CPM chart, which will cover weekly activity of mini project.
- A logbook to be prepared by each group, wherein group can record weekly work progress, guide/supervisor can verify and record notes/comments.
- Faculty supervisor may give inputs to students during mini project activity; however, focus shall be on self-learning.
- Students in a group shall understand problem effectively, propose multiple solution and select best possible solution in consultation with guide/ supervisor.
- Students shall convert the best solution into working model using various components of their domain areas and demonstrate.
- The solution to be validated with proper justification and report to be compiled in standard format of University of Mumbai.
- With the focus on the self-learning, innovation, addressing societal problems and entrepreneurship quality development within the students through the Mini Projects, it is preferable that a single project of appropriate level and quality to be carried out in two semesters by all the groups of the students. i.e. Mini Project 1 in semester III and IV. Similarly, Mini Project 2 in semesters V and VI.
- However, based on the individual students or group capability, with the mentor's recommendations, if the proposed Mini Project adhering to the qualitative aspects mentioned above gets completed in odd semester, then that group can be allowed to work on the extension of the Mini Project with suitable improvements/modifications or a completely new project idea in even semester. This policy can be adopted on case by case basis.

Guidelines for Assessment of Mini Project:

Term Work

- The review/ progress monitoring committee shall be constituted by head of departments of each institute. The progress of mini project to be evaluated on continuous basis, minimum two reviews in each semester.
- In continuous assessment focus shall also be on each individual student, assessment based on individual's contribution in group activity, their understanding and response to questions.
- Distribution of Term work marks for both semesters shall be as below:
 - Marks awarded by guide/supervisor based on logbook 10
 - Marks awarded by review committee 10
 - Quality of Project report 05

Review/progress monitoring committee may consider following points for assessment based on either one year or half year project as mentioned in general guidelines.

One-year project:

- In first semester entire theoretical solution shall be ready, including components/system selection and cost analysis. Two reviews will be conducted based on presentation given by students group.
 - First shall be for finalisation of problem
 - Second shall be on finalisation of proposed solution of problem.
- In second semester expected work shall be procurement of component's/systems, building of working prototype, testing and validation of results based on work completed in an earlier semester.
 - First review is based on readiness of building working prototype to be conducted.
 - Second review shall be based on poster presentation cum demonstration of working model in last month of the said semester.

Half-year project:

- In this case in one semester students' group shall complete project in all aspects including,
 - Identification of need/problem
 - Proposed final solution
 - Procurement of components/systems
 - Building prototype and testing
- Two reviews will be conducted for continuous assessment,
 - First shall be for finalisation of problem and proposed solution
 - Second shall be for implementation and testing of solution.

Assessment criteria of Mini Project:

Mini Project shall be assessed based on following criteria:

1. Quality of survey/ need identification
2. Clarity of Problem definition based on need.
3. Innovativeness in solutions
4. Feasibility of proposed problem solutions and selection of best solution
5. Cost effectiveness
6. Societal impact
7. Innovativeness
8. Cost effectiveness and Societal impact
9. Full functioning of working model as per stated requirements
10. Effective use of skill sets
11. Effective use of standard engineering norms
12. Contribution of an individual's as member or leader
13. Clarity in written and oral communication

- In **one year, project**, first semester evaluation may be based on first six criteria's and remaining may be used for second semester evaluation of performance of students in mini project.
- In case of **half year project** all criteria's in generic may be considered for evaluation of performance of students in mini project.

Guidelines for Assessment of Mini Project Practical/Oral Examination:

- Report should be prepared as per the guidelines issued by the University of Mumbai.
- Mini Project shall be assessed through a presentation and demonstration of working model by the student project group to a panel of Internal and External Examiners preferably from industry or research organisations having experience of more than five years approved by head of Institution.
- Students shall be motivated to publish a paper based on the work in Conferences/students competitions.

Mini Project shall be assessed based on following points:

1. Quality of problem and Clarity
2. Innovativeness in solutions
3. Cost effectiveness and Societal impact
4. Full functioning of working model as per stated requirements
5. Effective use of skill sets
6. Effective use of standard engineering norms
7. Contribution of an individual's as member or leader
8. Clarity in written and oral communication