Maharashtra State Board Of Technical Education, Mumbai

Learning and Assessment Scheme for Post S.S.C Diploma Courses

Programme Name : Diploma In Printing Technology

Programme Code : PN **With Effect From Academic Year** : 2023-24

Duration Of Programme : 6 Semester **Duration** : 16 WEEKS

Semester : Fifth **NCrF Entry Level : 4.0** **Scheme** : K

Sr No	Course Title	Abbrevation	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme												
						Actual Contact Hrs./Week			Self Learning (Activity/ Assignment /Micro Project)	Notional Learning Hrs /Week		Paper Duration (hrs.)	Theory				Based on LL & TL Practical				Based on Self Learning		Total Marks
						CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
													Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
(All Compulsory)																								
1	MANAGEMENT	MAN	AEC	315301	1	3	-	-	1	4	2	1.5	30	70*#	100	40	-	-	-	-	25	10	125
2	FLEXIBLE PACKAGING PROCESS	FPG	DSC	325334	-	3	-	4	1	8	4	3	30	70	100	40	25	10	25@	10	25	10	175
3	QUALITY CONTROL IN PRINTING	PQR	DSC	325335	-	3	-	4	1	8	4	3	30	70	100	40	25	10	25#	10	25	10	175
4	ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS	EDS	AEC	314014	-	1	-	2	1	4	2	-	-	-	-	-	50	20	25@	10	25	10	100
5	PRINTING MACHINE MAINTENANCE	PMM	SEC	325014	-	2	-	2	2	6	3	-	-	-	-	-	25	10	25#	10	25	10	75
6	PRINTING ON TEXTILES	PTX	AEC	325015	1	2	-	2	-	4	2	-	-	-	-	-	25	10	25@	10	-	-	50
Elective-II (Any - One)																								
7	ADVERTISING AND DIGITAL MARKETING	ADM	DSE	325336	-	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150
	DIGITAL PROOFING AND WORKFLOW	DPW	DSE	325337	-	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150
	SECURITY AND SPECIALITY PRINTING	SSP	DSE	325338	-	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150
Total					**2**	**18**		**16**	**6**		**20**		**120**	**280**	**400**		**175**		**150**		**125**		**850**

Abbreviations : CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends : @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

Course Category : Discipline Specific Course Core (DSC) , Discipline Specific Elective (DSE) , Value Education Course (VEC) , Intern./Apprenti./Project./Community (INP) , AbilityEnhancement Course (AEC) , Skill Enhancement Course (SEC) , GenericElective (GE)

ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS **Course Code : 314014**

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Agricultural Engineering/ Architecture/ Fashion & Clothing Technology/ Dress Designing & Garment Manufacturing/ Food Technology/ Instrumentation & Control/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Surface Coating Technology/ Textile Technology/ Travel and Tourism/ Textile Manufactures**
Programme Code	**: AA/ AE/ AL/ AT/ DC/ DD/ FC/ IC/ IS/ IX/ IZ/ ME/ MK/ ML/ MU/ PG/ PN/ SC/ TC/ TR/ TX**
Semester	**: Fourth / Fifth / Sixth**
Course Title	**: ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS**
Course Code	**: 314014**

I. RATIONALE

Entrepreneurship and Startup is introduced in this curriculum to develop the entrepreneurship traits among the students before they enter into the professional life. By exposing and interacting with entrepreneurship and startup eco-system, student will develop the entrepreneurial mind set. The innovative thinking with risk taking ability along with other traits are to be inculcated in the students through micro projects and training. This exposure will be instrumental in orienting the students in transforming them to be job generators after completion of Diploma in Engineering.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

• Develop project proposals for launching small scale enterprises and starts up.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Identify one's entrepreneurial traits.
- CO2 - Use information collected from stakeholder for establishing/setting up/founding starts up
- CO3 - Use support systems available for Starts up
- CO4 - Prepare project plans to manage the enterprise effectively

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
314014	ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS	EDS	AEC	1	-	2	1	4	2	-	-	-	-	-	50	20	25@	10	25	10	100

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Compare advantages and disadvantages of Entrepreneurship TLO 1.2 Identify entrepreneurial traits through self-analysis TLO 1.3 Compare risk associated with different type of enterprise	**Unit - I Introduction to Entrepreneurship Development** 1.1 Entrepreneurship as a career – charms, advantages, disadvantages , scope- local and global 1.2 Traits of successful entrepreneur: consistency, creativity, initiative, independent decision making, assertiveness, persuasion, persistence, information seeking, handling business communication, commitment to work contract, calculated risk taking, learning from failure 1.3 Types of enterprises and their features : manufacturing, service and trading	Presentations Lecture Using Chalk-Board
2	TLO 2.1 Explain Important factors essential for selection of product/service and selection of process TLO 2.2 Suggest suitable place for setting up the specified enterprise on the basis of given data/circumstances with justification. TLO 2.3 Suggest steps for the selection process of an enterprise for the specified product or service with justification. TLO 2.4 Plan a market study /survey for the specified enterprise	**Unit - II Startup Selection Process** 2.1 Product/Service selection: Process, core competence, product/service life cycle, new product/ service development process, mortality curve, creativity and innovation in product/ service modification / development 2.2 Process selection: Technology life cycle, forms and cost of transformation, factors affecting process selection, location for an industry, material handling. 2.3 Market study procedures: questionnaire design, sampling, market survey, data analysis 2.4 Getting information from concerned stakeholders such as Maharashtra Centre for Entrepreneurship Development[MCED], National Institute for Micro, Small and Medium Enterprises [NI-MSME], Prime Minister Employment Generation Program [PMEGP], Directorate of Industries[DI], Khadi Village Instries Commission[KVIC]	Presentations Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Explain categorization of MSME on the basis of turnover and investment TLO 3.2 Describe support system provided by central and state government agencies TLO 3.3 State various schemes of government agencies for promotion of entrepreneurship TLO 3.4 Describe help provided by the non-governmental agencies for the specified product/service TLO 3.5 Compute breakeven point, ROI and ROS for the specified business enterprise, stating the assumptions made	**Unit - III Support System for Startup** 3.1 Categorization of MSME, ancillary industries 3.2 Support systems- government agencies: MCED, NI-MSME, PMEGP,DI, KVIC 3.3 Support agencies for entrepreneurship guidance, training, registration, technical consultation, technology transfer and quality control, marketing and finance. 3.4 Breakeven point, return on investment (ROI) and return on sales (ROS).	Presentations Lecture Using Chalk-Board
4	TLO 4.1 Explain key elements for the given business plan with respect to their purpose/size TLO 4.2 Justify USP of the given product/ service from marketing point of view. TLO 4.3 Formulate business policy for the given product/service. TLO 4.4 Choose relevant negotiation techniques for the given product/ service with justification TLO 4.5 Identify risks that you may encounter for the given type of business/enterprise with justification. TLO 4.6 Describe role of the incubation centre and accelerators for the given product/service.	**Unit - IV Managing Enterprise** 4.1 Techno commercial Feasibility study, feasibility report preparation and evaluation criteria 4.2 Ownership, Capital, Budgeting, Matching entrepreneur with the project 4.3 Unique Selling Proposition [U.S.P.]: Identification, developing a marketing plan. 4.4 Preparing strategies of handling business: policy making, negotiation and bargaining techniques 4.5 Risk Management: Planning for calculated risk taking, initiation with low cost projects, integrated futuristic planning, definition of startup cycle, ecosystem , angel investors, venture capitalist 4.6 Incubation centers and accelerators : Role and procedure	Presentations Lecture Using Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Collect information of successful entrepreneurial traits	1	*Preparation of report on entrepreneurship as a career	2	CO1
LLO 2.1 Identify different traits as an entrepreneur from various field LLO 2.2 Suggest different traits from identified problem	2	Case study on ‘Traits of Entrepreneur’	2	CO1
LLO 3.1 Explore probable risks for identified enterprise.	3	*Case study on ‘Risks associated with enterprise	2	CO1
LLO 4.1 Identify new product for development LLO 4.2 Prepare a newly developed product	4	*Preparation of report on ‘Development of new Product’	2	CO1 CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 5.1 Identify Process for development of product for new startup	5	Preparation of Report on ‘ Process selection ‘ for new startup	2	CO1 CO2 CO3
LLO 6.1 Develop questioner for market survey	6	*Market survey for setting up new Start up	2	CO2 CO3
LLO 7.1 Interpret the use of Technology Life Cycle	7	A Case study on ‘ Technology life cycle’ of any successful entrepreneur.	2	CO3
LLO 8.1 Use information related to support of startups from Government and non-government agencies' LLO 8.2 Prepare report for setting up startup	8	*Preparation of report on ‘Information for setting up new startup’ from MCED/MSME/KVIC etc	2	CO3 CO4
LLO 9.1 Compute ROI of successful enterprise.	9	Case study on ‘Return on Investment (ROI)’of any successful startup	2	CO3
LLO 10.1 Calculate of ROS of any successful enterprise	10	Case study on ‘Return on sales (ROS)’of any successful startup	2	CO3
LLO 11.1 Calculate Brake even point of any enterprise	11	Preparation of report on ’Brake even point calculation’ of any enterprise.	2	CO3 CO4
LLO 12.1 Prepare feasibility report of given business	12	*Preparation of report on ‘feasibility of any Techno-commercial business”	2	CO4
LLO 13.1 Plan a USP of any enterprise.	13	*A case study based on ‘Unique selling Proposition (USP) of any successful enterprise	2	CO4
LLO 14.1 Prepare a project report using facilities of Atal Incubation center.	14	*Prepare project report for starting new startup using ‘Atal incubation center (AIC)	2	CO1 CO2 CO3 CO4

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Prepare a ‘ Women entrepreneurship business plan ‘ Choose relevant government scheme for the product/service
- Prepare a ‘Pitch- desk’ for your start up
- Prepare a business plan for a. Market research b. Advertisement agency c. Placement Agency d. Repair and Maintenance agency e. Tour and Travel agency
- Prepare a ‘Social entrepreneurship business plan, plan for CSR funding.
- Prepare a business plan for identified projects by using entrepreneurial eco system for the same (Schemes, incentives, incubators etc.)

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Computers with internet and printer facility	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Entrepreneurship Development	CO1	5	0	0	0	0
2	II	Startup Selection Process	CO2	4	0	0	0	0
3	III	Support System for Startup	CO3	3	0	0	0	0
4	IV	Managing Enterprise	CO4	3	0	0	0	0
Grand Total				**15**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

Summative Assessment (Assessment of Learning)

- End of Term Examination - Viva-voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	2	2	-	-	3	2			
CO2	2	2	2	2	-	3	2			
CO3	2	2	2	2	-	3	2			
CO4	2	2	2	2	-	3	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Dr. Nishith Dubey, Aditya Vyas , Annu Soman , Anupam Singh	Un- boxing Entrepreneurship your self help guide to setup a successful business	Indira Publishing House ISBN-2023,978-93-93577-70-2
2	Gujral, Raman	Reading Material of Entrepreneurship Awareness Camp	Entrepreneurship Development Institute of India (EDI), GOI, 2016 Ahmedabad
3	Chitale, A K	Product Design and Manufacturing	PHI Learning, New Delhi, 2014; ISBN: 9788120348738
4	Charantimath, Poornima	Entrepreneurship Development Small Business Entrepreneurship	Pearson Education India, New Delhi; ISBN: 9788131762264
5	Khanka, S.S.	Entrepreneurship and Small Business Management	S.Chand and Sons, New Delhi, ISBN: 978-93-5161-094-6

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://www.mced.nic.in/allproduct.aspx	MCED Product and Plan Details
2	http://niesbud.nic.in/Publication.html	The National Institute for Entrepreneurship and Small Business Development Publications
3	http://niesbud.nic.in/docs/1standardized.pdf	Courses : The National Institute for Entrepreneurship and Small Business Development
4	https://www.nabard.org/content1.aspx?id=23andcatid=23andmid=530	Government Schemes
5	https://www.nabard.org/Tenders.aspx?cid=501andid=24	NABARD - Information Centre
6	http://www.startupindia.gov.in/pdffile.php?title=Startup%20India%20Action%20Planandtype=Actionandq=Action%20Plan.pdfandcontent_type=Actionandsubmenupoint=action	Start Up India
7	http://www.ediindia.org/institute.html	About - Entrepreneurship Development Institute of India (EDII)
8	http://www.nstedb.com/training/training.htm	NSTEDB - Training

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

Programme Name/s	**: Architecture Assistantship/ Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ Interior Design/ Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Surface Coating Technology/ Computer Science/ Textile Technology/ Electronics & Computer Engg.**
Programme Code	**: AA/ AE/ AI/ AL/ AN/ AO/ AT/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DE/ DS/ EE/ EJ/ EK/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IZ/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SC/ SE/ TC/ TE**
Semester	**: Fifth / Sixth**
Course Title	**: MANAGEMENT**
Course Code	**: 315301**

I. RATIONALE

Effective management is the cornerstone of success for both organizations and individuals. It empowers diploma engineers/ professionals to accomplish their tasks with finesse and efficiency through strategic planning and thoughtful execution, projects can optimize finances, enhance safety measures, facilitate sound decision-making, foster team collaboration and cultivate a harmonious work environment. The diploma engineers require leadership and management skills with technical knowledge of the core field to carry out various tasks smoothly. This course aims to instill fundamental management techniques, empowering diploma engineers/ professionals to enhance their effectiveness in the workplace.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences: Apply the relevant managerial skills for achieving optimal results at workplace.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Use relevant management skills to handle work situation
- CO2 - Apply appropriate techniques of product, operations and project management
- CO3 - Use comprehensive tools of recent management practices
- CO4 - Plan suitable marketing strategy for a product / service
- CO5 - Utilize supply chain and human resource management techniques for effective management

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

MANAGEMENT **Course Code : 315301**

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
315301	MANAGEMENT	MAN	AEC	3	-	-	1	4	2	1.5	30	70*#	100	40	-	-	-	-	25	10	125

Total IKS Hrs for Sem. : 1 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Justify the importance of management thoughts in Indian knowledge system. TLO 1.2 Describe the importance of management in day to day life. TLO 1.3 Explain Henry Fayol’s principles of management. TLO 1.4 Describe the role of each level of management in its management hierarchy. TLO 1.5 Practice the self management skills for a given situation TLO 1.6 Apply the required managerial skills for a given situation	**Unit - I Introduction to Management** 1.1 Evolution of management thoughts from ancient/medieval to modern times in India (IKS) 1.2 Management: meaning, importance, characteristics, functions & challenges. 1.3 Introduction to scientific management- Taylor's & Fayol's principles of management 1.4 Levels & functions of management at supervisory level. 1.5 Self management skills: Self awareness, self discipline, self motivation, goal setting, time management, decision making, stress management, work life balance and multitasking 1.6 Overview of Managerial Skills: negotiation skills, team management, conflict resolution, feedback, leadership	Presentations Case Study Interactive session Quiz competition Mixed Picture Puzzle

MANAGEMENT **Course Code : 315301**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 Identify the appropriate creativity technique for new product development TLO 2.2 Describe the new product development process for a product / service TLO 2.3 Comprehend the importance of various strategic steps Product Management TLO 2.4 Elaborate Agile product management TLO 2.5 Explain the significance of the Project Management TLO 2.6 Describe the various tools of project management	**Unit - II Product, Operations and Project Management** 2.1 Creativity and innovation management: creativity techniques - brainstorming, checklist, reverse brainstorming, morphological analysis, six thinking hats. 2.2 New product development, change management 2.3 Product Management -meaning, strategic steps for sustainable design of a product 2.4 Agile product management- concept, benefits, principles and manifesto 2.5 Project Management: importance, areas within project management,4Ps and phases 2.6 Tools of Project Management: PERT and CPM, GANTT & Chart Overview of Estimate and Budget	Presentations Case Study Video Demonstrations Presentations Role Play
3	TLO 3.1 Understand the importance of quality management tools TLO 3.2 Explain the importance of various techniques for optimization and waste minimization TLO 3.3 State the importance of ISO quality standards TLO 3.4 Describe ERP TLO 3.5 State the importance of ISO TLO 3.6 Recognize the importance of customer satisfaction as a competitive advantage	**Unit - III Management Practices** 3.1 Quality circle, kaizen, Six Sigma, TQM 3.2 5S, Kanban card system, TPM, Lean Manufacturing: Meaning, Steps and Importance 3.3 Quality Standards and ISO: Meaning, ISO 9001:2016, ISO 14000, OSHA 2020 3.4 The overview of ERP along with example 3.5 Service quality and customer/client satisfaction, servicescape	Presentation Case study Interactive session Quiz Video Demonstration Lecture Using Chalk-Board
4	TLO 4.1 Explain the importance of marketing techniques TLO 4.2 Explain the importance of needs, wants and desires in marketing TLO 4.3 Interpret the traditional and digital marketing techniques TLO 4.4 Plan different aspects of an event management	**Unit - IV Marketing Management** 4.1 Marketing management: meaning, significance, Seven P's of Marketing 4.2 Needs, wants and demands in marketing. Customer relationship management 4.3 Types of marketing: traditional and digital marketing 4.4 Event management: types, different aspects of event management, crisis management	Case Study Interactive session based video Role Play Flipped Classroom Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 State the importance of supply chain and logistics management TLO 5.2 Explain the components of supply chain and logistics Management TLO 5.3 Describe the role of information technology in supply chain & logistics management TLO 5.4 State the significance of Human Resource Management TLO 5.5 Analyze the various methods of recruitment, selection and training for an organization TLO 5.6 List the qualities of a successful supervisor	**Unit - V Supply Chain & Human Resource Management** 5.1 The overview of Supply Chain and logistics Management 5.2 Components of Supply Chain and logistics Management 5.3 Role of information technology in supply chain & logistics management 5.4 Overview of Human Resource Management-Meaning,significance,scope and principles 5.5 Recruitment, selection and training of human resources. Chalk Circle 5.6 Qualities of a successful supervisor /team leader and types of leadership	Presentations Video Demonstrations Case Study Collaborative learning Video Demonstrations Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES : NOT APPLICABLE.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Assignment / Article

- Make a one page note based on a book of management you read.
- Write a short article on inventory management exploring online learning resources.
- Prepare a report on ISO standards applicable to your field. a. IATF 16949-2016 / SLA-TS 16949-2016, - Automotive Industry b. ISO 22000 — Food safety management c. ISO 50001 — Energy management d. ISO/IEC 27001 - Cyber Security e. ISO/DIS 4931-1 - Buildings and civil engineering works
- Prepare a 4 quadrant matrix of time management for managing the tasks.
- Prepare a report on any one software used for Supply Chain and Logistics Management.
- Prepare a GANTT Chart for project management related to your field.

Note Taking

- Watch a Tedx Talk Video on managerial skills and take notes in the form of keywords.

Case Study

- Prepare a case study and discuss the same on following topics a.Self Management Skills b.Six Thinking Hats c.Kaizen d.Quality Circle e.Safety Measures in different organizations related to your field
- Study the recruitment and selection process of any organization related to your field.
- Prepare a case study on management lessons based on life of Chhatrapati Shivaji Maharaj
- Conduct outbound training on managerial skills. Make a video and upload on social media.

Quizes

- Participate in online quizzes related to areas of management .

Assignment

- Workshops to be conducted for students on following topics a. creativity techniques b. time management c. stress management d. negotiation and conflict e. goal setting f. meditation new product development

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED : NOT APPLICABLE

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Management	CO1	13	8	6	4	18
2	II	Product, Operations and Project Management	CO2	8	2	4	6	12
3	III	Management Practices	CO3	8	4	4	6	14
4	IV	Marketing Management	CO4	8	2	4	6	12
5	V	Supply Chain & Human Resource Management	CO5	8	4	4	6	14
Grand Total				**45**	**20**	**22**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- MCQ Based Class Test, Self Learning Activities / Assignment

Summative Assessment (Assessment of Learning)

- Summative Assessment (Assessment of Learning) MCQ based

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3

CO1	1	1	1	-	-	2	3			
CO2	1	3	3	-	1	3	3			
CO3	1	3	1	-	1	1	3			
CO4	1	2	2	-	1	2	3			
CO5	1	1	2	-	1	2	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	A. K. Gupta	Engineering Management	S. Chand, ISBN: 81-219-2812-5, 2007, 2nd Edition
2	O. P. Khanna	Industrial Engineering &management	Dhanpat Rai Publication, ISBN: 978-8189928353, 2018
3	Harold Koontz and Heinz Weinrich	Essentials of Management	Tata McGraw Hill Education ISBN: 9789353168148, 2020, 12th edition
4	E. H. McGrath	Basic Managerial Skills for All	PHI ISBN: 978-8120343146, 2011, 9th Edition
5	Andrew DuBrin	Management Concepts and Cases	Cengage Learning, ISBN: 978-8131510537, 2009, 9th edition
6	K. Dennis Chambers	How Toyota Changed the World	Jaico Books ISBN: 978-81-8495-052-6, 2009
7	Jason D. O'Grandy	How Apple changed the Wolrd	Jaico Publishing House ISBN: 978-81-8495-052-0, 2009
8	Subhash Sharma	Indian Management	New Age International Private Limited ; ISBN-978-9389802412, 2020, 1st edition
9	Chitale, Dubey	Organizational Behaviour Text and Cases	PHI LEARNING PVT. LTD., ISBN: 978-9389347067, 2019, 2nd Edition

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.debonogroup.com/services/core-programs/six-thinking-hats/	Six Thinking Hats
2	https://hbr.org/1981/09/managing-human-resources	HR Management
3	https://theproductmanager.com/topics/agile-product-management/	Agile Product Management
4	https://www.cdlogistics.ca/freight-news/the-5-components-of-supply-chain-management	Supply Chain Management
5	https://www.infosectrain.com/blog/understanding-the-concepts-of-gantt-chart-and-critical-path-methodology-cpm	PERT, CPM, GANTT Chart
6	https://www.simplilearn.com/best-management-tools-article	Management Tools
7	https://www.psychometrica.in/free-online-psychometric-tests.html	Psychometric Tests
8	https://www.investopedia.com/terms/e/erp.asp	ERP
9	https://asq.org/quality-resources/quality-management-system	QMS
10	https://testlify.com/test-library/creative-thinking/	Psychometric Tests
11	https://www.mindtools.com/	Management Skills
12	https://www.investopedia.com/terms/d/digital-marketing.asp	Digital Marketing

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

MANAGEMENT **Course Code : 315301**

MSBTE Approval Dt. 24/02/2025 **Semester - 5 / 6, K Scheme**

PRINTING MACHINE MAINTENANCE **Course Code : 325014**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **PRINTING MACHINE MAINTENANCE**
Course Code : **325014**

I. RATIONALE

Printing diploma engineer performs the duties of a technician in the printing press and operates different machines. These machines and equipment must be maintained properly by routine, preventive and breakdown maintenance in order to achieve precise and lifelong performance. This course helps learners understand and practice the maintenance tools and procedures in printing organizations of different sizes.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Conduct maintenance activities of printing machines.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Apply maintenance approaches followed in printing presses.
- CO2 - Conduct lubrication for given machine.
- CO3 - Use mechanical drives and solve bearing problems.
- CO4 - Operate hydraulic system on printing machines.
- CO5 - Operate pneumatic system on printing machines.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325014	PRINTING MACHINE MAINTENANCE	PMM	SEC	2	-	2	2	6	3	-	-	-	-	-	25	10	25#	10	25	10	75

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

PRINTING MACHINE MAINTENANCE **Course Code : 325014**

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Select appropriate machine configurations. TLO 1.2 Prepare maintenance schedule for machines. TLO 1.3 Elaborate need and objectives of TPM.	**Unit - I Maintenance Management** 1.1 Factors affecting equipment purchasing such as technical specifications and use. 1.2 Need for planned maintenance, Maintenance types - Contract, preventive and breakdown. 1.3 TPM in Printing - Need & Objectives, Benefits, OEE - Definition, purpose and simple numerical, Process Capability concept and numerical.	Lecture Using Chalk-Board Case Study Site/Industry Visit
2	TLO 2.1 Select appropriate type of lubricant. TLO 2.2 Identify functioning and characteristics of lubricants. TLO 2.3 Classify bearings used in printing machines.	**Unit - II Lubrication** 2.1 Need, working principle and and applications of lubrication. Requirements and characteristics of lubricants. 2.2 Classification of lubricants - Petroleum, animal and vegetable, grease, graphite, aerosol. Advantages of lubrication and hazards of inappropriate lubrication. Maintenance required for lubrication systems. 2.3 Types, need, working principle and applications of bearings. Maintenance required for different types of bearings.	Video Demonstrations Hands-on Lecture Using Chalk-Board
3	TLO 3.1 Select appropriate drive for continuous power transmission. TLO 3.2 Select appropriate drive for intermittent power transmission. TLO 3.3 Identify safety measures while using mechanical drives.	**Unit - III Mechanical Drives** 3.1 Working principle, types and applications of chains, sprockets, belts and pulleys. Maintenance needed in using mechanical drives for continuous power transmission. 3.2 Working principle, types and applications of cams. Maintenance needed in using cams. 3.3 Working principle and types of safety devices used on printing machines.	Lecture Using Chalk-Board Model Demonstration Demonstration
4	TLO 4.1 Explain working of hydraulic system. TLO 4.2 Elaborate applications hydraulic system.	**Unit - IV Hydraulic System** 4.1 Working principle and construction of general hydraulic system. Major parts and functions. Advantages and disadvantages of hydraulic system. 4.2 Various applications of hydraulic system in printing. Safety measures and precaution needed while working with hydraulic system. Maintenance of hydraulic system.	Lecture Using Chalk-Board Video Demonstrations Hands-on
5	TLO 5.1 Explain Working principle, types, consruction working of Pneumatic system TLO 5.2 Identify functioning of pneumatic system components TLO 5.3 Elaborate saftety measures.	**Unit - V Pneumatic System** 5.1 Working principle, types, construction and applications of compressor. 5.2 Applications of pneumatic system in printing machines and its advantages. 5.3 Safety measures and precaution for operating pneumatic system. Maintenance of pneumatic systems.	Lecture Using Chalk-Board Video Demonstrations Hands-on

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Prepare preventive maintenance plan for press room machines.	1	*Prepare checklist for routine maintenance of press machines and prepare preventive maintenance plan for press machines.	2	CO1

PRINTING MACHINE MAINTENANCE **Course Code : 325014**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 2.1 Prepare checklist for routine maintenance of press machines.	2	Prepare checklist for lubrication points during maintenance of press machines and carry out maintenance of central lubrication system of offset machine according to manual's instructions.	2	CO1 CO2
LLO 3.1 Prepare checklist for lubrication points during maintenance of paper cutting machines.	3	*Carry out maintenance of paper cutting machine according to manual's instructions.	2	CO1 CO2
LLO 4.1 Carry out maintenance of Central lubrication system of offset machine according to manual's instructions.	4	Perform greasing operation to drive mechanisms and bearings of press machine.	2	CO1 CO2
LLO 5.1 Carry out maintenance of pile lifting mechanism according to manual's instructions	5	Perform maintenance of pile lifting mechanism on offset sheet fed machines.	2	CO1 CO3
LLO 6.1 Perform tensioning operation to drive mechanism and bearings of press machines	6	*Carry out chain tensioning on drive mechanism according to manual's instructions on offset machine.	2	CO1 CO3
LLO 7.1 Perform belt tensioning of cutting machine.	7	Carry out belt tensioning on drive mechanism according to manual's instructions on cutting machine	2	CO1 CO3
LLO 8.1 Suggest remedies for problems related to the belt drive power transmission.	8	Suggest remedies for problems related to the belt drive power transmission.	2	CO3
LLO 9.1 Perform greasing operation to gear mechanism of printing unit of planographic offset printing machine.	9	*Perform greasing operation to gear mechanism of printing unit of planographic offset printing machine and Perform greasing operation to bearings of inking and forwarding rollers of offset printing machine.	2	CO3
LLO 10.1 Perform gear changeover operation on plate cylinder shaft of Flexo / Gravure machine according to manual's instructions.	10	Carry out gear changeover operation on plate cylinder shaft of Flexo / Gravure machine according to manual's instructions.	2	CO3
LLO 11.1 Perform greasing operation to gear mechanism of printing unit of offset printing machine.	11	*Perform greasing operation to gear mechanism of printing unit of offset printing machine.	2	CO3
LLO 12.1 Perform maintenance of pallet lifting mechanism of trolley.	12	Perform maintenance of pallet lifting mechanism of trolley.	2	CO3
LLO 13.1 Demonstrate functioning of floor lift having centralized hydraulic system.	13	*Demonstrate functioning of floor lift having centralized hydraulic system.	2	CO4
LLO 14.1 Carry out filter cleaning / changeover operation on centralized hydraulic system.	14	Carry out Filter Cleaning / Changeover operation on centralized hydraulic system according to manual's instructions.	2	CO4
LLO 15.1 Perform maintenance of suckers and blowers on planographic offset printing machine.	15	*Perform maintenance of suckers and blowers on planographic offset printing machine.	2	CO5
LLO 16.1 Adjust settings of doctor blade assembly on gravure printing machine.	16	Adjust settings of doctor blade assembly on gravure printing machine.	2	CO5

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 17.1 Carry out air filter cleaning / changeover operation on pneumatic system according to manual's instructions.	17	*Carry out Air Filter Cleaning / Changeover operation on Pneumatic system according to manual's instructions.	2	CO5
LLO 18.1 Adjust settings of impression roller assembly on gravure printing machine.	18	Adjust settings of Impression Roller Assembly on Gravure Printing machine	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Collect the information of various types of Lubricants available in market and list their containing additives
- Collect Pictorial images of badly lubricated or damaged parts because of lack of lubrication observed on different locations
- Enlist all the bearings used in offset printing machine available in Institute.
- Collect information about maintenance activities and check list followed by local printing press.
- Prepare purchase requisition having Technical specifications, terms and conditions of procurement, quotations for machine, discounts, terms and conditions of installation, training and check list for selection of new machine in printing department.

Assignment

- Enlist all the types of bearings used in different printing machines available in institute
- Collect information and make a video presentation about Pallet designs and materials used for pallets.
- Prepare list for safety norms for Fire Hazards and Chemical Hazards
- Prepare preventive maintenance plan for Machines available in Workshop Department, Mechanical Department and Printing Department
- Collect information and make video presentation about Hydraulic system applications other than printing.
- Collect information and make video presentation about Pneumatic system application other than printing.
- Make video presentation / animation showing one of application of Pneumatic system in printing.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number

PRINTING MACHINE MAINTENANCE **Course Code : 325014**

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Workshop Tool Kit (Hand tools, Drill machine, Grinding machine, Industrial tools, Spanners etc.)	All
2	Offset Planographic Printing machine - Two colour, Alcohol dampening	All
3	Flexographic Printing Machine - single colour, Hot air dryer, etc	All
4	Gravure Printing Machine - single colour, Hot air dryer, etc	All
5	Bearing / Gear Puller - 25 mm min. Shaft dia	All
6	Grease Gun - Manual operations	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Maintenance Management	CO1	6	0	0	0	0
2	II	Lubrication	CO2	6	0	0	0	0
3	III	Mechanical Drives	CO3	6	0	0	0	0
4	IV	Hydraulic System	CO4	6	0	0	0	0
5	V	Pneumatic System	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- Actual performance in external practical examination of 25 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	1	2	0	1	0	2	3			
CO2	1	2	0	3	0	0	3			
CO3	1	2	0	3	0	0	3			
CO4	1	2	0	3	0	0	3			
CO5	1	2	0	3	0	0	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number

PRINTING MACHINE MAINTENANCE **Course Code : 325014**

Sr.No	Author	Title	Publisher with ISBN Number
1	Dhillon B. S.	Engineering Maintenance : A Modern Approach	CRC Press, London 2002 ISBN: 1-58716-142-7
2	Neale M.J.	Lubrication and Reliability	Botterworth Heinemann Boston, 2001 ISBN: 0-7506-51-54-7
3	Mobley R.K., Higgins I.R., Wikoff R.J.	Maintenance Engineering Handbook	Mc Graw Hill, New Delhi 2008 ISBN: 978-1-4615-7606-8
4	Jain R.K., Rao S.S.	Industrial Safety, Health and Environmental Management System	Khanna Publication, New Delhi 2015 ISBN: 817-409-2102
5	Garg H.P.	Industrial Maintenance	S. Chand Publications, New Delhi ISBN : 978-8121-901-680
6	Steve Borris	Total Productive Maintenance	Mc Graw Hill, US, 2005 ISBN: 978-0-071-467-339
7	Khurmi R.S., Gupta J. K.	A Text Book of Machine Design	Eurasia Publishing House, New Delhi 2005 ISBN:978-8121925372

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=bA6a7lkhOmk&list=PLjk-OqI4WmPIrFQHL2xgZTUpccu_1URhE	Video having Information about Cam and Follower
2	https://www.youtube.com/watch?v=Kuj2X6ncPBc	Video having Information about Lubricant Important, Functions And Classification
3	https://www.youtube.com/watch?v=egNKCqWdzRM	Video having Information about Gear train, types of gear train
4	https://www.youtube.com/watch?v=ZhDO16FDmxA&t=66s	Video having Information about Gear Types, Design Basics, Applications and More - Basics of Gears
5	https://www.youtube.com/watch?v=ZFd4bxpleKw	Video having Information about Bearing Number Meaning, Bearing Nomenclature.
6	https://www.youtube.com/watch?v=8q25EUszBSI	Video having Information about What is Bearing? Types of Bearings and How they Work?
7	https://www.youtube.com/watch?v=7WbddnjSFyQ	Video having Information about Hydraulic System and its applications
8	https://www.youtube.com/watch?v=lBARBZNLxQI	Video having Information about Pneumatic System and its applications

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

PRINTING ON TEXTILES **Course Code : 325015**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **PRINTING ON TEXTILES**
Course Code : **325015**

I. RATIONALE

Printed textiles mainly include curtains, upholstery, wallpaper, bed sheets, cushions, towels, tablecloths, and napkins. In today's scenario, prints are not limited to the textile surfaces only, but they are also visible on other non-textiles products and wearable electronics. India earns about 27% of its total foreign exchange through textile exports and contributes nearly 14% to the total industrial production of the country. The printing processes for textile fabrics need understanding of colourants, dyes, and after-treatments. This course has a potential to prepare a learner to develop entry level skills required in textile printing industry.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Print on various textiles.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Select appropriate fibres.
- CO2 - Identify the pre-treatments.
- CO3 - Print using screen printing process.
- CO4 - Apply digital printing processes for textile materials.
- CO5 - Explain post treatments and troubleshooting.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325015	PRINTING ON TEXTILES	PTX	AEC	2	-	2	-	4	2	-	-	-	-	-	25	10	25@	10	-	-	50

Total IKS Hrs for Sem. : 1 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Select appropriate raw materials for textiles. TLO 1.2 List types and properties of natural fibres. TLO 1.3 List types and properties of man-made fibres.	**Unit - I Types of fibres** 1.1 Raw materials used in textile industry: Fibres, chemicals. 1.2 Natural Fibres and their properties related to printing: Vegetable Fibres (Cellulosic Fibre), Cotton, Flax (Linen), Jute, Natural Animal Fibres (Protein Fibres), Wool, Hair, Silk. 1.3 Man-Made Fibres and their properties related to printing: Acetate, Viscose Rayon, Lyocell (Trade Name 'Tencel'), Polyester, Nylon (Polyamide), Acrylic and Modacrylic, Polyolefins. IKS: Ancient methods practised in India to print on textiles such as Madhubani, Block printing, Screen printing, Dyes, Colorants etc.	Lecture Using Chalk-Board Presentations Video Demonstrations
2	TLO 2.1 Elaborate the need for pre-treatments of textiles. TLO 2.2 Identify pre-treatments for natural fibres. TLO 2.3 Identify pre-treatments for man made (synthetic) fibres.	**Unit - II Treatments before printing** 2.1 Need for pre-treatments, Effects of pre-treatment on printing 2.2 Pretreatment (Preparation) for Cellulosic fibres and Animal fibres: Grey Inspection, Singeing, Desizing, Scouring, Bleaching, Mercerization, Fluorescent Brightening 2.3 Pretreatment for Man-Made (Synthetic) Fibres, Desizing, Scouring and Relaxation, Heat Setting, Bleaching.	Lecture Using Chalk-Board Presentations Video Demonstrations
3	TLO 3.1 Prepare design for screen printing process. TLO 3.2 Explain the construction and working of screen printing machines. TLO 3.3 Elaborate on troubleshooting for screen printing on textiles.	**Unit - III Printing using screen printing process** 3.1 Design and image formation of image for screen printing, advantages, limitations and applications of screen printing, types of mesh and mesh selection factors, types of squeegees and their specifications. 3.2 Screen printing machines: Flatbed and Rotary, construction and working. 3.3 Troubleshooting: Registration, frame marks, mottling, splashing.	Lecture Using Chalk-Board Presentations Site/Industry Visit
4	TLO 4.1 Prepare design for digital printing process. TLO 4.2 Explain major types of Inkjet printing technology. TLO 4.3 Elaborate the formulation of inks for digital textile printing.	**Unit - IV Printing using digital printing process** 4.1 Computer aided design, editing and data storage systems, pixel and image formation by ink jet printers, color management. 4.2 Substrate preparation for ink-jet printing, Ink jet printing technology (CIJ/DOD), optional pre and post-treatments for pigmented digital textile printing. 4.3 Ink formulation for digital textile printing, process colors, spot colors, tests on pigmented textile inks, white ink.	Lecture Using Chalk-Board Presentations Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Select appropriate finishing agents for the given use. TLO 5.2 Identify preparatory steps prior to finishing textiles. TLO 5.3 Elaborate on the eco-standards for finishing.	**Unit - V Post treatments and troubleshooting** 5.1 Finishing agents - Stiffening agents, cross linking agents, Water softeners, water repellents and optical brighteners, flame retarding agents, antimicrobial UV protective, antistatic, ant pilling agents, soil release, moth-proof, mildew proof agents, Natural Finishing Agents, Textile Finishes. 5.2 Preparatory Steps Prior to Finishing textiles, Functional Finishes, Wash and wear and crease recovery finishes, Water repellent and water proof finishes, Ecofriendly finishing with enzymes, Role of Nano technology is textile finishing 5.3 Eco-standards for finishing, Effluent Treatment, Recycle and reuse of textile waste water, Solid waste management in textile industries, Sustainable materials.	Lecture Using Chalk-Board Presentations Video Demonstrations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Fabrics made from natural vegetable fibres.	1	* Identify fabrics made from three natural vegetable fibres.	2	CO1
LLO 2.1 Fabrics made from natural animal fibres.	2	Identify fabrics made from three natural animal fibres.	2	CO1
LLO 3.1 Fabrics made from man made (synthetic) fibres.	3	Identify fabrics made from three man made (synthetic) fibres.	2	CO1
LLO 4.1 Raw materials used in textile industry.	4	Identify raw materials used in textile industry.	2	CO1
LLO 5.1 Pretreatment (preparation) for Cellulosic fibres and Animal fibres	5	* Identify pretreatment (preparation) for Cellulosic fibres and Animal fibres: Grey Inspection, Singeing, Desizing.	2	CO2
LLO 6.1 Pretreatment (preparation) for Man-Made (Synthetic) fibres.	6	* Identify pretreatment (preparation) for Man-Made (Synthetic) Fibres: Desizing, Scouring and Relaxation, Heat Setting, Bleaching.	2	CO2
LLO 7.1 Flatbed screen printing on natural vegetable fibres.	7	* Print on natural vegetable fibres - cotton garment using a flat bed screen printing	2	CO3
LLO 8.1 Flatbed screen printing on natural animal fibres.	8	* Print on natural animal fibres - woolen garment using flatbed screen printing.	2	CO3
LLO 9.1 Flatbed screen printing on synthetic fibres.	9	* Print on three synthetic fibres using flatbed screen printing.	2	CO3
LLO 10.1 Working of rotary screen printing	10	Demonstration of rotary screen printing machine for continuous printing.	2	CO3
LLO 11.1 Working of thermal transfer on natural fibres.	11	* Print with thermal transfer on three natural fibres.	2	CO4
LLO 12.1 Application of thermal transfer on synthetic fibres.	12	* Print with thermal transfer on synthetic fibres. (3 samples)	2	CO4
LLO 13.1 Ink jet printing on natural fibre garments.	13	* Ink jet printing on natural fibre garments.	2	CO4
LLO 14.1 Ink jet printing on synthetic fibre garments.	14	* Ink jet printing on synthetic fibre garments.	2	CO4
LLO 15.1 Demonstrate the working of DTG printer.	15	Demonstrate the working of DTG printer.	2	CO4

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Post treatment for natural fibres	16	Identify posttreatment for Cellulosic fibres and Animal fibres.	2	CO5
LLO 17.1 Post treatment synthetic fibres.	17	Identify posttreatment synthetic fibres.	2	CO5
LLO 18.1 Demonstrate effluent treatment method for textiles.	18	Demonstrate effluent treatment method for textiles.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Survey digital printing presses using textile materials and present report.
- Classify printed textiles samples on the basis of printing processes.
- Tabulate information on raw material suppliers for printing on textiles.
- Collect samples having different finishing / embellishments.
- Visit local market and prepare availability report on different fabrics.

Assignment

- Create and publish a short video on social media on printed textiles.
- Compare specifications of two digital printing machines.
- Compare specifications of rotary and flat screen printing machines.
- Explore internet to document the scope of printed textiles.
- Visit nearby garment printing factory and conduct interview of a technical personnel.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Manual screen printing set up	3
2	Thermal transfer machine	3,4
3	Inkjet printing machine (with RIP)	4
4	Computer (16 GB RAM)	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification

Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Types of fibres	CO1	6	0	0	0	0
2	II	Treatments before printing	CO2	6	0	0	0	0
3	III	Printing using screen printing process	CO3	6	0	0	0	0
4	IV	Printing using digital printing process	CO4	6	0	0	0	0
5	V	Post treatments and troubleshooting	CO5	6	0	0	0	0
Grand Total				**30**	**0**	**0**	**0**	**0**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- Actual performance in internal practical examination of 25 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	1	1	1	1	1	1	1			
CO2	1	2	1	1	2	1	2			
CO3	1	1	2	2	2	1	2			
CO4	2	2	2	2	3	1	2			
CO5	2	2	2	2	3	1	2			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Asim Kumar Roy Choudhury	Principles of Textile Printing	Routledge ISBN 9781138478305
2	Hua Wang, Hafeezullah Memon	Digital Textile Printing Science, Technology and Markets	Elsevier ISBN: 9780443154140
3	Sue Westergaard	Screenprinting on Textiles: The Complete Guide	The Crowood Press Ltd ISBN-10 178500753X
4	H. Ujiie	Digital printing of textiles	Woodhead Publishing Limited (Imprint Elsevier) ISBN: 9781855739512

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=jRNqaOA8ZRI	What is Textile Printing, Different Methods of Textile Printing
2	https://www.youtube.com/watch?v=OZ_MNH4XrkI	Types of Digital Textile Printing Machines
3	https://www.youtube.com/watch?v=eeUDnikKBCY	Digital Textile Printing Process - Direct fabric printing and Sublimation Printing Step by Step
4	https://www.youtube.com/watch?v=GsRrRmSRsAU	Rotary Screen Printing Process in a Textile industry all over printing
5	https://www.youtube.com/watch?v=AX-4YnGTGPk	Mimaki TX300P-1800B Direct-to-Textile Inkjet Printer Indonesia

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

FLEXIBLE PACKAGING PROCESS **Course Code : 325334**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **FLEXIBLE PACKAGING PROCESS**
Course Code : **325334**

I. RATIONALE

With the growth in FMCG industry and the increase in the food consumer base, flexible packaging is gaining importance. To effectively learn this course, students must have prior knowledge about materials and various printing processes. This course intends to deal with additional knowledge of packaging requirements such as a variety of substrates, product preservation, enhanced consumer experience, sustainable practices, and finishing operations. This course will help to develop skills along with knowledge in flexible packaging industry's sectors namely raw material testing, finished product testing and printing on flexible films.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply printing and packaging knowledge for sustainable and environment friendly print production.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Select appropriate flexible package designs for different applications.
- CO2 - Select appropriate packaging material for given job.
- CO3 - Plan workflow of basic packaging machines.
- CO4 - Suggest sustainable packaging methods for given job.
- CO5 - Solve environmental issues related to packaging material.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325334	FLEXIBLE PACKAGING PROCESS	FPG	DSC	3	-	4	1	8	4	3	30	70	100	40	25	10	25@	10	25	10	175

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 List different types of packaging functions. TLO 1.2 Classify the polymers. TLO 1.3 Identify various materials used in flexible packaging.	**Unit - I Materials in flexible packaging** 1.1 Flexible packaging: meaning, areas of applications, advantages, limitations. 1.2 Polymer: Meaning, classification, type of polymerization - Addition, Condensation; Thermoset/ Thermoplastic. Additives in plastics: anti-slip, antistatic, colorants, fillers, plasticizers. 1.3 General Properties, Applications of following polymers related to the packaging - Polyethylene (PE), Polypropylene (PP), Polyvinyl Chloride (PVC), Polycarbonate (PC), Polyamide (PA), Polystyrene (PS), Polycarbonate (PC), Polyurethane.	Lecture Using Chalk-Board Video Demonstrations Presentations
2	TLO 2.1 Identify appropriate extrusion style according to job. TLO 2.2 Select appropriate lamination technique. TLO 2.3 Explain blister pack technique, label application methods.	**Unit - II Plastic converting techniques** 2.1 Plastic extrusion technology – Blown film extrusion – single layer and multi-layer film manufacturing process, die blow mouldings – split die, sheet extrusion process control. Injection molding – Meaning, bottle manufacturing. 2.2 Lamination techniques – Dry lamination, wet lamination, Sealing: heat sealing methods, Types of sealers: wire, rod, band, conductive etc. 2.3 Strip packaging, Blister pack technique – use of materials, manufacturing process, backing material for Blister; Label application – label pasting; closures, liners for closures.	Lecture Using Chalk-Board Presentations Site/Industry Visit
3	TLO 3.1 State functions of multi-layer packaging. TLO 3.2 Select appropriate pack forming machine. TLO 3.3 Explain aseptic packaging technique.	**Unit - III Multilayer packaging applications** 3.1 Lamitube - Structure of lamitube, layers in laminate, plastic properties, manufacturing process, printing on lamitubes. 3.2 Pouch forming machines, filling machine, stand up pouches – materials used for pouches; Pack forming on HFF and VFF machines; Bag in Box – process, Retort packaging, Packaging Requirements. Shrink wrapping and stretch wrapping machines, films for shrink /stretch wrapping, Applications. 3.3 Aseptic packaging – concept, process, and sterilization processes, requirements of films; Tetra Pak – lamination processes, sterilization processes.	Lecture Using Chalk-Board Presentations Video Demonstrations
4	TLO 4.1 Explain preservation techniques for food packaging. TLO 4.2 Identify materials based on their properties. TLO 4.3 List package requirements of food packaging.	**Unit - IV Food packaging applications** 4.1 Preservation techniques for food packaging. Sterilization process for containers. 4.2 Physical, chemical properties of materials used for package, barrier properties of packaging materials. 4.3 Requirements of package for food packaging: dairy products, carbonated soft drinks, beverages, bakery products, alcoholic drinks, meat products.	Lecture Using Chalk-Board Presentations Site/Industry Visit

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Identify packaging based on atmospheric conditions. TLO 5.2 Explain sustainable packaging. TLO 5.3 List indicators on packages.	**Unit - V Sustainable packaging methods** 5.1 Controlled Atmosphere Packaging Technology (CAP), Modified Atmosphere Packaging Technology (MAP) – Concept, Process, Advantages and disadvantages. 5.2 Sustainable packaging methods: environmental aspects related to packaging, edible packaging, Extended Producers Responsibility (EPR) - meaning, importance. 5.3 Different types of Indicators and labels to asses the shelf life of package. Intelligent and Active Packaging: Reacting material for CO2, Oxygen, Methane, Ethylene etc.	Lecture Using Chalk-Board Presentations Case Study

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Identify the packaging method.	1	* Identify the packaging method of collected samples. (minimum 3)	4	CO1
LLO 2.1 Identify the packaging function.	2	* Identify packaging function of collected samples. (minimum 3)	4	CO1
LLO 3.1 Measure caliper of materials.	3	* Collection and measuring the thickness of flexible packaging material preferably with a micrometer or suitable instrument. (minimum 3).	4	CO1
LLO 4.1 Identify grain direction.	4	Identify the grain direction of papers. (3 samples).	4	CO1
LLO 5.1 Identify lamination method.	5	* Separate lamination layer to understand the method. (3 samples)	4	CO2
LLO 6.1 Identify materials in blister pack.	6	* Identify materials in blister pack.	4	CO2
LLO 7.1 Prepare specifications for printing of blister pack.	7	* Prepare specifications for printing of blister pack. (3 samples)	4	CO2
LLO 8.1 Identify materials in lamitube.	8	Identify materials in lamitube. (3 samples)	4	CO3
LLO 9.1 Identify materials in Tetra Pak.	9	* Identify materials in Tetra Pak. (3 samples)	4	CO3
LLO 10.1 Prepare specifications for printing of lamitube.	10	Prepare specifications for printing of lamitube. (3 samples)	4	CO3
LLO 11.1 Prepare specifications for printing of Tetra Pak.	11	* Prepare specifications for printing of Tetra Pak. (3 samples)	4	CO3
LLO 12.1 Identify materials for packaging of soft drinks.	12	Identify materials for packaging of soft drinks. (3 samples)	4	CO4
LLO 13.1 Identify materials for packaging of meat products.	13	* Identify materials for packaging of meat products. (3 samples)	4	CO4
LLO 14.1 Demonstrate working of HFF and VFF machines.	14	Demonstrate working of HFF and VFF machines.	4	CO4

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 15.1 Prepare specifications for printing of labels.	15	* Prepare specifications for printing of labels. (3 samples)	4	CO4
LLO 16.1 Identify materials for the edible packaging.	16	* Identify materials for the edible packaging. (3 samples)	4	CO5
LLO 17.1 Demonstrate registration process for EPR certification.	17	Demonstrate registration process for EPR (Extended Producers Responsibility) certification.	4	CO5
LLO 18.1 Identify sustainable materials and practices.	18	Identify sustainable materials and practices, Usage of PIR (Post Industrial Recycled) / PCR (Post Consumer Recycled) materials.	4	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Compare various plastics used for packaging.
- Compare cost of same product with different packaging material.
- Collect information about export requirements of boxes in different countries.
- Make report showing comparison product price on the basis of its quantity and packaging.
- Survey a local market and present a report on labels used.

Assignment

- Visit segregation or recycling setups in local areas and prepare a report on the workflow of packaging life cycle.
- Visit packaging testing lab in local area to learn different tests performed on package and submit a report.
- Visit packaging setups in local area and prepare a report on workflow of production and interview a technical personnel.
- Create and publish a short video on social media on different flexible packages and materials used.
- Explore internet resources and tabulate information on raw materials used in flexible package printing.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number

FLEXIBLE PACKAGING PROCESS **Course Code : 325334**

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Micrometer Screw Gauge - 25 mm, analog, LC - 0.01mm	All
2	Shrink wrapping machine	All
3	Stretch wrapping machine	All
4	Packaging designing software	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Materials in flexible packaging	CO1	8	4	4	4	12
2	II	Plastic converting techniques	CO2	10	4	6	6	16
3	III	Multilayer packaging applications	CO3	10	4	6	6	16
4	IV	Food packaging applications	CO4	10	4	6	6	16
5	V	Sustainable packaging methods	CO5	7	2	4	4	10
Grand Total				**45**	**18**	**26**	**26**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two unit tests of 30 marks each.
- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- Actual performance in internal practical examination of 25 marks.
- End semester theory examination of 70 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	2	1	2	1	2			
CO2	2	2	2	1	2	1	2			
CO3	2	2	3	1	2	1	3			
CO4	2	3	3	1	3	2	3			
CO5	1	3	3	1	3	2	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number

FLEXIBLE PACKAGING PROCESS **Course Code : 325334**

Sr.No	Author	Title	Publisher with ISBN Number
1	S. P. Athavale	Hand Book of Printing, Packaging and Lamination : Packaging Technology	Notion Press ISBN 1644292505
2	Walter Soroka	Fundamentals of Packaging Technology	Institute of Packaging Professionals ISBN 1930268289
3	Susan E.M. Selke	Plastics Packaging: Properties, Processing, Applications, and Regulations	Hanser Publications ISBN 1569903727
4	Thomas Dunn	Manufacturing Flexible Packaging: Materials, Machinery, and Techniques	William Andrew, ISBN-10 0323264360
5	John R. Wagner Jr.	Multilayer Flexible Packaging: Technology and Applications for the Food, Personal Care, and Over-the-Counter Pharmaceutical Industries	William Andrew, ISBN-10 0323371000

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=PkQW3-RjqEE	Tetra Pak® TR/G7 – A journey through the machine
2	https://www.flexpack.org	Sustainable flexible packaging
3	https://www.youtube.com/watch?v=YoNf0dj-jUc	Flexible Packaging Film Manufacturing Process
4	https://www.youtube.com/watch?v=xNePYj2GydM	Glenroy's Flexible Packaging Manufacturing Process
5	https://www.youtube.com/watch?v=Et8pjxUScJ4	The Full Process of Creating Plastic Flexible Packaging
6	https://www.youtube.com/watch?v=2tlQkREGOsU	Shaping the future of the flexible packaging world
7	https://www.youtube.com/watch?v=5eBRHcqwHLk	Everything There is to Know About Flexible Packaging.

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

QUALITY CONTROL IN PRINTING **Course Code : 325335**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **QUALITY CONTROL IN PRINTING**
Course Code : **325335**

I. RATIONALE

Quality control is an effective system of integrating quality development, quality maintenance and quality improvement efforts, so as to enable production and services at most economical level which tends towards full customer satisfaction. In this course student will acquire the knowledge about quality control tools, equipment, methodologies used for quality control. Emphasis is placed on acquiring the fundamentals of print quality, quality control aids, management systems, and quality standards related to materials. For process calibration and standardization of printing processes, the knowledge of this course is essential. This course is designed to impart skills to the learner required in quality parameter measurement and analysis.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Control quality in print production.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Identify quality control stages along with responsibilities.
- CO2 - Use quality control aids effectively.
- CO3 - Interpret requirements of various standards used in different printing processes.
- CO4 - Apply quality management systems in different printing process.
- CO5 - Interpret control charts for variable and attribute data.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325335	QUALITY CONTROL IN PRINTING	PQR	DSC	3	-	4	1	8	4	3	30	70	100	40	25	10	25#	10	25	10	175

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Define quality control. TLO 1.2 Explain the concept of quality control and quality assurance. TLO 1.3 List objectives of quality control.	**Unit - I Basics of Quality** 1.1 Concept of quality, quality cost, quality inspection 1.2 Quality assurance and quality control, Stages of quality control, objective of quality control 1.3 Objectives of quality control, Responsibilties of quality control officer	Video Demonstrations Presentations Lecture Using Chalk-Board
2	TLO 2.1 Identify quality improvement tools. TLO 2.2 Elaborate use of quality control tools. TLO 2.3 Study quality control parameters.	**Unit - II Quality Control Aids** 2.1 Quality improvement tools- check sheets, flowcharts, histogram. 2.2 Quality control tools – Colour control bar, Test form. 2.3 Color control parameters – Density, Dot Gain, Contrast, Trapping, Color difference (Delta E), Grey balance.	Video Demonstrations Presentations Lecture Using Chalk-Board
3	TLO 3.1 Identify press optimization standards TLO 3.2 Elaborate requirement of standards TLO 3.3 Examine print on standard parameters	**Unit - III Quality Control Standards** 3.1 Press optimization standards & press calibration. 3.2 ISO 9000 , ISO 14000, ISO Standards for Printing – 12647-1/2/3/4/5/6/7/8/9. 3.3 Purpose and application area of SWOP, GRACoL, G7, FOGRA, TAPPI.	Video Demonstrations Presentations Lecture Using Chalk-Board
4	TLO 4.1 Use terminologies of quality control. TLO 4.2 Interpret elements of statistics. TLO 4.3 Calculate statistical quantities.	**Unit - IV Quality Management Systems** 4.1 Purpose, benefits and application area of Six Sigma, 5S, Kaizen, TQM, Lean Management. 4.2 Mean, Mode, Median: Meaning, simple numerical. 4.3 Standard deviation, Variance: Meaning, simple numerical.	Video Demonstrations Lecture Using Chalk-Board Presentations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Apply SPC/SQC in processes. TLO 5.2 Elaborate sampling method TLO 5.3 Plot control chart.	**Unit - V Statistical Quality Control** 5.1 Introduction to Statistical Process Control (SPC) and its applications for print Industry. 5.2 Concept of sampling, probability sampling, non-probability sampling. 5.3 Control chart for Variables, Attributes – X-R chart, P chart, Process capability, simple numerical.	Lecture Using Chalk-Board Video Demonstrations Presentations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Compare densities.	1	*Measure the solid print density of each CMYK color using a process color control bar and plot the results on a line chart to compare the densities.	4	CO1
LLO 2.1 Determine trapping and plot the graph.	2	Determine the trapping of the print samples and use the gathered data to create a graph that visually represents the trapping of each sample.	4	CO2
LLO 3.1 Analyze print quality based on print contrast and dot gain calculations.	3	Calculate the print contrast and dot gain of the sample and plot these values on a graph to analyze the print quality.	4	CO2
LLO 4.1 Illustrate the relationship between the input and output tonal values.	4	*Analyze the print characteristics dot gain curve of the sample and plot the data to illustrate the relationship between the input and output tonal values.	4	CO2
LLO 5.1 Quantify the color differences between the samples and a reference.	5	*Measure CIE LAB values and calculate the Delta E values to quantify the color differences and calculate standard deviation of 10 samples.	4	CO2
LLO 6.1 Measure the color gamut steps on a given test chart.	6	*Use a spectrophotometer to plot the color gamut steps on a given test chart.	4	CO3
LLO 7.1 Prepare a specification chart recommended by SWOP.	7	Prepare a specification chart that includes both the SWOP recommended parameters and the measured values.	4	CO3
LLO 8.1 Compile the ISO 12647 recommendations and specifications	8	*Compile the ISO 12647 recommendations and specifications for planographic offset and screen printing.	4	CO3
LLO 9.1 Identify application of G7 methodology in offset printing.	9	Demonstrate the G7 methodology in printing processes.	4	CO3
LLO 10.1 Explain how the 5S methodology improves efficiency in a printing press.	10	*Demonstrate the 5S methodology's implementation process and outcomes.	4	CO4
LLO 11.1 Calculating six sigma.	11	*Calculate sigma value for a given printed lot on the basis of defect opportunities.	4	CO4
LLO 12.1 Create X-bar and R charts to monitor and control the printing process quality.	12	*Measure the solid ink density of the samples and use the data to plot an X-bar chart and an R chart to monitor and control the printing process quality.	4	CO5
LLO 13.1 Analyze the calculated values to interpret the central tendency of the data.	13	Calculate the mean, mode, and median from the given data.	4	CO5
LLO 14.1 Analyze the X-R chart to identify trends, patterns, and outliers.	14	Plot an X-R chart using the given numerical data.	4	CO5

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 15.1 Illustrate Total Quality management.	15	Create a workflow related to Total Quality Management (TQM) for the packaging and printing sectors.	4	CO4

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Identify areas of waste in a 4-color sheet-fed offset press. Implement Six Sigma tools such as DMAIC (Define, Measure, Analyze, Improve, Control). Report on the waste reduction outcomes and process improvements.
- Collect data on print parameters such as density, dot gain, and color balance. Calculate mean, mode, median, standard deviation, and variance. Draw X-R charts and interpret the results in a comprehensive report.
- Collect product samples that exhibit defects and quality issues.
- Visit nearest printing/ packaging unit and measure the solid ink density across multiple samples. Create X-bar and R charts to visualize the consistency. Analyze the results and suggest improvements for uniformity and compile report on same.

Assignment

- Visit local press setups to observe the TQM practices used during packaging job production. Compile your findings and suggest possible improvements.
- Prepare a detailed report on prevention quality costs by visiting the nearest printing and packaging facility.
- Conduct a 5S audit in a various departments in your institute and implement the 5S principles . Create a report documenting the changes and improvements.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Digital proofer	1,2,3
2	Densitometer - Density, dot gain, trapping measurements.	1,2,3,4
3	Data Handling Software (Excel) - For calculations, graph.	12,13,14
4	Spectrophotometer/ Spectrodensitometer- For LAB*, Delta E, Gamut measurements.	5,6

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Basics of Quality	CO1	7	4	6	4	14
2	II	Quality Control Aids	CO2	8	4	4	6	14
3	III	Quality Control Standards	CO3	10	4	4	6	14
4	IV	Quality Management Systems	CO4	10	4	4	6	14
5	V	Statistical Quality Control	CO5	10	4	4	6	14
Grand Total				**45**	**20**	**22**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.
- Two unit tests of 30 marks each and average of two unit tests out of 30 marks.

Summative Assessment (Assessment of Learning)

- Actual performance in external practical examination of 25 marks.
- End semester assessment of 70 marks through offline examination.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	1	1	2	2	2	2	3			
CO2	2	3	2	2	2	3	2			
CO3	2	2	2	2	3	2	2			
CO4	2	2	2	2	1	2	2			
CO5	2	3	3	2	2	2	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Juran	Quality Control Handbook	McGraw-Hill Inc.,US (1 January 1989), ISBN-13: 978-0071005104
2	Prof. Dr.-Ing. habil. Helmut Kipphan	Handbook of Print Media	Springer-Verlag Berlin Heidelberg New York ISBN 3-540-67326-1
3	Sayankar Vinod	Total Quality Management	Everest Publishing House, ISBN-10: 8176602671, ISBN-13: 978-8176602679
4	Michael Barnard	Print and Production Manual	Pira International, United Kingdom ISBN 1 85802 238 X

QUALITY CONTROL IN PRINTING **Course Code : 325335**

Sr.No	Author	Title	Publisher with ISBN Number
5	Pyzdek	Six Sigma Handbook	McGraw-Hill Inc., US, ISBN-10: 9789339221775, ISBN-13: 978-9339221775

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=kEngca8RvCg	ISO 12647
2	https://www.youtube.com/watch?v=oLKq-gmHsV0	Optimization of digital file
3	https://www.youtube.com/watch?v=B9j4gHTEzds	Printing quality assurance
4	https://www.youtube.com/watch?v=fpNMGZCQEss	5S Implementation in printing industry
5	https://www.youtube.com/watch?v=fKvEkOFzhjQ	Total Quality Management

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

ADVERTISING AND DIGITAL MARKETING **Course Code : 325336**

Programme Name/s : **Printing Technology**

Programme Code : **PN**

Semester : **Fifth**

Course Title : **ADVERTISING AND DIGITAL MARKETING**

Course Code : **325336**

I. RATIONALE

This curriculum will help students to understand the fundamentals of advertising and digital marketing. It covers essential concepts such as the evolution of advertising, digital marketing techniques, and the integration of print and digital media. By combining theoretical knowledge with practical applications, students will learn how to design and produce effective print advertising and create campaigns for print and digital platforms. The practical exercises are aimed at giving hands-on experience in creating and managing advertising projects, ensuring that students are well-prepared for entry-level roles in the advertising and printing industries.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply digital tools and platforms used in various advertising and digital marketing campaigns.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Select appropriate types of advertising for a purpose.
- CO2 - Use digital marketing platforms.
- CO3 - Build a campaign using market research.
- CO4 - Develop designs for print advertising.
- CO5 - Apply various digital advertising techniques.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325336	ADVERTISING AND DIGITAL MARKETING	ADM	DSE	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Define advertising and explain its role in the business world. TLO 1.2 Explain evolution of advertising. TLO 1.3 Explain key concepts of advertising. TLO 1.4 Identify ethical issues in advertising and role of regulatory bodies in ensuring ethical practices.	**Unit - I Introduction to Advertising** 1.1 Definition and Importance of Advertising : What is Advertising?, Importance of Advertising in Business, Types of Advertising (Print, Broadcast, Digital, Outdoor) 1.2 History and Evolution of Advertising: Early Forms of Advertising, Evolution Through the Ages, Modern Advertising Trends 1.3 Key Concepts in Advertising: Target Audience, Brand Awareness, Advertising Campaigns, Advertising Media 1.4 Ethics in Advertising: Ethical Considerations, False Advertising, Regulatory Bodies and Guidelines in India	Presentations Lecture Using Chalk-Board
2	TLO 2.1 Define digital marketing, its scope and advantages over traditional marketing methods. TLO 2.2 Describe key components of digital marketing. TLO 2.3 Evaluate the strategics of major digital marketing platforms. TLO 2.4 Measure digital marketing success.	**Unit - II Fundamentals of Digital Marketing** 2.1 Introduction to Digital Marketing:Definition and Scope, Differences Between Traditional and Digital Marketing, Advantages of Digital Marketing, 2.2 Key Components of Digital Marketing : Search Engine Optimization (SEO), Content Marketing, Social Media Marketing, Email Marketing, 2.3 Digital Marketing Platforms : Overview of Major Platforms (Google, Facebook, Instagram, LinkedIn, Twitter), Platform Specific Strategies. 2.4 Measuring Digital Marketing Success: Key Performance Indicators (KPIs), Analytics Tools (Google Analytics, Social Media Insights), Reporting and Analysis,	Presentations Lecture Using Chalk-Board
3	TLO 3.1 Conduct market research. TLO 3.2 Develop advertising strategies for various advertising. TLO 3.3 Identify the target audience for advertising of a product. TLO 3.4 Plan advertising campaigns.	**Unit - III Advertising Strategy and Planning** 3.1 Market Research: Understanding Market Research, Tools and Techniques for Market Research, Analyzing Market Research Data 3.2 Creating Advertising Strategies: Setting Advertising Objectives, Developing a Budget, Selecting the Right Media Channels 3.3 Crafting the Message: Understanding Consumer Psychology, Creating Persuasive Messages, Storytelling in Advertising 3.4 Campaign Planning: Planning an Advertising Campaign, Execution and Monitoring, Evaluating Campaign Effectiveness	Presentations Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Apply design tools. TLO 4.2 Plan various pre-press, press and post press involvement with advertising. TLO 4.3 Create campaigns that combine print and digital media. TLO 4.4 Plan, execute, and evaluate a print advertising campaign.	**Unit - IV Advertising Design Considerations** 4.1 Design principles for print media : Basics of layout and design, typography and color theory, use of images and graphic, tools for print design, creating mockups and Prototypes 4.2 Understanding various printing techniques, pre-press and post-press processes. 4.3 Cross-media campaigns: how print and digital media complement each other, case studies of cross-media campaigns, qr codes, tools and techniques for creating interactive print ads. 4.4 Project planning and concept development: setting objectives and goals, designing and creating print materials (posters, flyers, brochures), managing the printing process, evaluating and presenting the final campaign.	Presentations Lecture Using Chalk-Board
5	TLO 5.1 Create SEM and PPC campaigns. TLO 5.2 Design social media advertisements. TLO 5.3 Develop engaging content and collaborate with influencers to enhance marketing efforts. TLO 5.4 Create email marketing campaigns and mobile marketing.	**Unit - V Digital Advertising Techniques** 5.1 Search Engine Marketing (SEM): Introduction to SEM, Pay-Per-Click (PPC) Advertising 5.2 Social Media Advertising: Advertising on Facebook, Instagram, LinkedIn, and Twitter, Creating Effective Social Media Ads, Budgeting for Social Media Campaigns 5.3 Content and Influencer Marketing: Creating Engaging Content, Working with Influencers, Measuring Content Performance 5.4 Email and Mobile Marketing: Fundamentals of Email Marketing, Building Email Lists, Mobile Marketing Strategies	Presentations Collaborative learning

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Design a Business Card	1	Design a Business Card using designing software.	2	CO1 CO4
LLO 2.1 Design an eye-catching event poster using designing software.	2	Design an eye-catching event poster using designing software.	2	CO3 CO4
LLO 3.1 Design a professional magazine cover	3	Design a Magazine Cover Page	2	CO4
LLO 4.1 Generate and integrate a QR code into a print ad, linking print to digital content.	4	*Generate and integrate a QR code into a print ad, linking print to digital content.	2	CO4 CO5
LLO 5.1 Create an outdoor billboard for a local business	5	*Design an outdoor billboard for a local business	2	CO4
LLO 6.1 Develop a concept for a print ad campaign, demonstrating creativity and strategic thinking in advertising.	6	*Create a Print Ad Campaign Concept	2	CO3 CO4
LLO 7.1 Design a product packaging mockup, showcasing their ability to create practical and appealing packaging designs.	7	Develop a Mockup for a Product Packaging Design	2	CO1 CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 8.1 Design a print newsletter, demonstrating their skills in layout design and content organization.	8	Design a Print Newsletter Layout	2	CO4
LLO 9.1 Demonstrate working of Advertising agency	9	*Report a study of local advertising agencies.	2	CO3
LLO 10.1 Prepare a file for various printing processes.	10	Prepare a Print-Ready File for various printing processes, ensuring it meets all necessary specifications for high-quality print output.	2	CO4
LLO 11.1 Preparing and Upload Small Video Advertisement on Social Media Platform	11	*Preparing and Upload Small Video Advertisement on Social Media Platform	2	CO2 CO5
LLO 12.1 Demonstrate working of a E-commerce website	12	*Demonstrate working of a E-commerce website	2	CO5
LLO 13.1 Create a print media plan, outlining strategies, budgets, and timelines for an advertising campaign.	13	*Develop a Print Media Plan, outlining strategies, budgets, and timelines for an advertising campaign.	2	CO3 CO4
LLO 14.1 Create a digital media plan, outlining strategies, budgets, and timelines for an advertising campaign.	14	*Develop a Digital Media Plan, outlining strategies, budgets, and timelines for an advertising campaign.	2	CO2 CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Interview an advertising firm employee and report the start to end process of an advertisement.
- Collect print media advertisements of Schools in your area and report.
- Collect information of different ads run for a particular brand and report the variations over time.

Assignment

- Choose a package and describe the steps involved in the manufacturing of the package.
- Connect to few social media Influencer's and understand their working pattern
- Create strategy for marketing your brand.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Suitable Designing Software for Print and Digital Media	All
2	Social Media Portals, Website and internet connection	All
3	Hardware: Computers and printers	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Introduction to Advertising	CO1	10	4	4	4	12
2	II	Fundamentals of Digital Marketing	CO2	12	4	6	4	14
3	III	Advertising Strategy and Planning	CO3	12	4	4	4	12
4	IV	Advertising Design Considerations	CO4	12	4	6	6	16
5	V	Digital Advertising Techniques	CO5	14	4	6	6	16
Grand Total				**60**	**20**	**26**	**24**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two unit tests of 30 marks each.
- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- End semester theory examination of 70 marks.
- Actual performance in external practical examination of 25 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	-	2	2	1	-	-			
CO2	2	2	2	3	1	-	2			
CO3	1	2	1	2	-	3	3			
CO4	-	3	2	2	1	-	2			
CO5	-	2	3	2	2	3	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	George E. Belch, Michael A. Belch	Advertising and Promotion: An Integrated Marketing Communications Perspective"	McGraw-Hill Education ISBN: 978-0071087214
2	J. Philip Kotler	Principles of Advertising	Pearson Education India ISBN: 978-9332588707
3	Dr. S. Ramesh Kumar	Digital Marketing: A Practical Approach	McGraw-Hill Education ISBN: 978-9352603831
4	Dave Chaffey, Fiona Ellis-Chadwick	Digital Marketing: Strategy, Implementation, and Practice	Pearson Education India ISBN: 978-9353066630
5	Ryan Deiss, Russ Henneberry	Digital Marketing For Dummies	Wiley ISBN: 978-1119235590

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.coursera.org/professional-certificates/unilever-digital-marketing-analyst	Unilever Digital Marketing Analyst Professional Certificate
2	https://skillshop.exceedlms.com/student/collection/648385-digital-marketing?sid=0f1800e7-9433-4a71-b9cc-340a97ee9491&sid_i=1	Fundamentals of digital marketing
3	https://www.coursera.org/projects/create-design-digital-products-canva	Create and Design Digital Products using Canva
4	https://skillshop.exceedlms.com/student/collection/654140-customers-needs-behaviours?sid=0f1800e7-9433-4a71-b9cc-340a97ee9491&sid_i=7	Understand customers needs and online behaviours
5	https://skillshop.exceedlms.com/student/collection/658338-promote-business-online?sid=0f1800e7-9433-4a71-b9cc-340a97ee9491&sid_i=18	Promote a business with online advertising
6	https://academy.hubspot.com/courses/digital-advertising-training	Digital Ads Training Course
7	https://adage.com/series/digital-crash-course/8	Digital crash course
8	https://academy.hubspot.com/courses/digital-advertising?utm_source=resources&utm_medium=hubspot_resources&utm_campaign=digital_advertising_cert	Digital Advertising Certification Course
9	https://www.coursera.org/learn/foundations-of-digital-marketing-and-e-commerce	Foundations of Digital Marketing and E-commerce

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

DIGITAL PROOFING AND WORKFLOW **Course Code : 325337**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **DIGITAL PROOFING AND WORKFLOW**
Course Code : **325337**

I. RATIONALE

The intent of this course is to select the digital proofing methods and workflow needed to print a particular job. This course is intended to teach students techniques to ensure that mistakes made during the file preparation stage are identified and corrected before production. After completion of the course, the student will have the ability to choose an efficient workflow for every printing activity for the timely and economical processing of job orders.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Choose a digital proofing and workflow for efficient and cost-effective job processing.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Classify the digital proof.
- CO2 - Identify the appropriate digital proofing techniques.
- CO3 - Select the appropriate digital proofing techniques to proof the given job.
- CO4 - Identify the stages in print production workflow.
- CO5 - Analysis of digital workflow and its implication in printing industry.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325337	DIGITAL PROOFING AND WORKFLOW	DPW	DSE	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Define digital proofing. TLO 1.2 Types of proofing. TLO 1.3 Classify the digital proofing technology.	**Unit - I Overview of Digital Proofing** 1.1 Overview of digital proofing: Definition, importance, and applications in the printing and packaging industry. advantages and application of digital proofing technology. 1.2 Types of Proofing: Concept proof. soft proof Color, target proof, hard proof, remote software for digital proofing. 1.3 Digital Proofing Technologies: Ink jet, Electrophotography, Dye sublimation, Thermal wax. Simulation (halftone dot proofing), Steps in digital proofing, File Formats used in the digital proofing. Comparison between conventional proofing and digital proofing.	Lecture Using Chalk-Board Video Demonstrations Presentations
2	TLO 2.1 Elaborate on need of quality control in digital proofing. TLO 2.2 List the hardware and software used for digital proofing system. TLO 2.3 Suggest the proofing standards.	**Unit - II Proofing Techniques and Quality Control** 2.1 Quality Control in Proofing: Identifying and correcting errors in proofs, use of tools, equipment. 2.2 Hardware and software used for digital proofing system: technical specifications of software, printers, colorants (ink/toner). 2.3 Proofing Standards: Industry standards for proofing and certification: ISO 12347-7, SWOP / GRACoL, G7 certification for proofing systems.	Video Demonstrations Lecture Using Chalk-Board Presentations
3	TLO 3.1 Elaborate the need of color managed workflow for digital proofing. TLO 3.2 Explain the calibration for monitor, printer, and proofing device. TLO 3.3 List the software for on-screen proofing.	**Unit - III Importance of Color Management in Digital Proofing** 3.1 Color Management: Basics of color management, color gamut, color managed workflow, rendering intents 3.2 Color Calibration and Profiling: Color gamut mapping, monitor, printer, and proofing device calibration. Understanding and using ICC profiles in digital proofing. 3.3 Soft Proofing Techniques: Use of software for on-screen proofing.	Video Demonstrations Lecture Using Chalk-Board Presentations
4	TLO 4.1 Explain the significance of digital workflow TLO 4.2 Identify the tasks in a Digital Production Workflow TLO 4.3 Elaborate digital Workflow with Computer-Integrated Manufacturing	**Unit - IV Basics of Workflow Basics and its Management** 4.1 Understanding digital workflow: Definition, components, and significance in printing. Advantages, limitations and future developments. 4.2 Production flow: Data and material flow for print media production. Digital Workflow for pre-press and its main stages, Tasks in a Digital Production Workflow, Preflight for various jobs. 4.3 Digital Workflow with Computer-Integrated Manufacturing (CIM), Digital Asset Management (DAM): creating folders on servers, schedule Process, retrieve elements, process error trapping & notification, correction handling, intervention. Software for digital workflow management. Print Production Format (PPF), Job Definition Format (JDF).	Lecture Using Chalk-Board Presentations Video Demonstrations

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
5	TLO 5.1 Explain the need of automation in print production. TLO 5.2 Application of Artificial intelligence in digital proofing. TLO 5.3 Suggest Sustainable practices in proofing and workflow. Identify how artificial intelligence is going to affect workflow and digital proofing in the future.	**Unit - V Advancement in Digital Proofing and Emerging Technologies** 5.1 Automation in Workflow: CIP4 Integrating Prepress, Press, and Post press, Benefits and challenges of automation in print industry. 5.2 Application of Artificial intelligence in digital proofing and workflow: present and future, smart print factories. 5.3 Sustainable practices, materials in proofing and workflow, certifications.	Video Demonstrations Presentations Lecture Using Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 List the steps in proofing of brochure printing.	1	* List the steps in preflighting and proofing of brochure printing. (2 samples)	2	CO1
LLO 2.1 List the steps in proofing of newspaper printing. (2 samples)	2	List the steps in preflighting and proofing of newspaper printing. (2 samples)	2	CO1
LLO 3.1 List the steps in proofing of printing for rigid packaging. (2 samples)	3	List the steps in preflighting and proofing of printing for rigid packaging. (2 samples)	2	CO1
LLO 4.1 List the steps in proofing of label printing.	4	List the steps in preflighting and proofing of label printing. (2 samples)	2	CO1
LLO 5.1 Apply RIP to the PS file.	5	Apply RIP to the PS file and decide specifications for RIP output. (2 samples)	2	CO2
LLO 6.1 Arrange lighting to view soft digital proof.	6	* Arrange lighting as per ISO 3664, to view soft digital proof.	2	CO2
LLO 7.1 Operate special purpose color monitors.	7	Operate special purpose color monitors for proper viewing of soft proof. (BenQ, Eizo monitor)	2	CO2
LLO 8.1 Calibrate the display monitor.	8	* Calibrate the display color monitor using colorimeter.	2	CO3
LLO 9.1 Prepare color profile of the display monitor.	9	Prepare color profile of the display monitor.	2	CO3
LLO 10.1 Prepare color profile of the digital printer.	10	* Prepare color profile of the digital printer using spectrophotometer.	1	CO3
LLO 11.1 Prepare color profile of the substrate.	11	* Prepare color profile of the substrate (2 samples).	2	CO3
LLO 12.1 Apply color profile of substrate to the monitor.	12	Apply color profile of substrate to the monitor.	2	CO3
LLO 13.1 Carry out proofing using inkjet printer.	13	* Carry out proofing using inkjet printer for offset printing job and analyze the results.	2	CO3
LLO 14.1 Carry out proofing using laser printer.	14	* Carry out proofing using laser printer for offset printing job and analyze the results.	2	CO3
LLO 15.1 Demonstrate JDF preparation.	15	Demonstrate JDF preparation in CIP4.	2	CO4
LLO 16.1 Demonstrate workflow of smart print factory.	16	Demonstrate workflow of smart print factory.	2	CO5
LLO 17.1 Carry out digital proofing on sustainable materials.	17	* Carry out digital proofing on sustainable materials. (2 samples)	2	CO5

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 18.1 Plan steps in designing automated digital workflow.	18	Plan steps in designing automated digital workflow.	2	CO5
LLO 19.1 List the steps for workflow	19	Create Conventional workflow for the book publication	2	CO4

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- Create and publish a short video on social media on various international standards and tools namely GRACoL, ISO 12647, SWOP and G7.
- Explore internet resources and compile a list of software and output devices for proofing.
- Interview a technical personnel from a reputed digital printing press and document the information.

Micro project

- Tabulate the output devices and their specifications used in proofing.
- Visit the nearest packaging printing unit & understand the workflow.
- Visit the nearest commercial printing unit & understand the workflow.
- Survey a local market and present a report on preflight practices.
- Collect samples of proofs taken on different digital printing processes.

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Display monitor	All
2	Inkjet printer with RIP	All
3	Spectrophotometer.	All
4	Colorimeter	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Overview of Digital Proofing	CO1	14	4	6	6	16

DIGITAL PROOFING AND WORKFLOW **Course Code : 325337**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
2	II	Proofing Techniques and Quality Control	CO2	10	4	4	4	12
3	III	Importance of Color Management in Digital Proofing	CO3	10	4	4	8	16
4	IV	Basics of Workflow Basics and its Management	CO4	16	4	4	8	16
5	V	Advancement in Digital Proofing and Emerging Technologies	CO5	10	4	4	2	10
Grand Total				**60**	**20**	**22**	**28**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two unit tests of 30 marks each.
- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- End semester theory examination of 70 marks.
- Actual performance in external practical examination of 25 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	2	2	1	1	1	1			
CO2	2	2	2	2	1	2	1			
CO3	1	2	1	1	2	2	1			
CO4	1	2	2	2	1	1	1			
CO5	1	2	2	1	2	1	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Hugh M. Speirs	Introduction to Prepress	PIRA Intentional, ISBN:1858029015
2	Michael Barnard	Print and Production Manual	Pira International, United Kingdom ISBN 1 85802 238 X
3	Helmut Kipphan	Handbook of Print Media: Technologies and Production Methods	Springer-Verlag Berlin Heidelberg New York: ISBN 3-540-67326-1
4	Ric Withers	Digital Workflow	Windsor Professional Information, ISBN- 1-893190-08-0

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=Z0Wb1Z9i0uY	Digital Proofing in Adobe Acrobat
2	https://www.youtube.com/watch?v=lXh_1U1unyk	Digital Proofing
3	https://www.youtube.com/watch?v=LiBIf2xQuB8	Proofing of Packaging product
4	https://www.youtube.com/watch?v=f_SrCC0znNA	Workflow Automation: What Every Printer Needs to Know
5	https://www.youtube.com/watch?v=wTfqNVVVPL0&t=98s	Print Production Workflow_3 P's
6	https://www.youtube.com/watch?v=6EJAJXE02xc	PrePress Workflow for Package Printing
7	https://www.youtube.com/watch?v=5ZbJYgSxFfA	Workflows and prepress automation actually work
8	https://www.youtube.com/watch?v=ZDttYkDS7gE	JDF & CIP4

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

SECURITY AND SPECIALITY PRINTING **Course Code : 325338**

Programme Name/s : **Printing Technology**
Programme Code : **PN**
Semester : **Fifth**
Course Title : **SECURITY AND SPECIALITY PRINTING**
Course Code : **325338**

I. RATIONALE

Security printing is the field of the printing industry that deals with the printing of items such as banknotes, cheques, passports, tamper-evident labels, security tapes, product authentication, stock certificates, postage stamps and identity cards. The main goal of security printing is to prevent forgery, tampering, or counterfeiting. On prerequisite knowledge of printing fundamentals and technology, this course is intended to create awareness about security and speciality techniques used to print and protect these high-value documents.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Print job using security and speciality printing techniques.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Suggest ink and substrate related security features for the given job.
- CO2 - Apply press, postpress and speciality security features in the given job.
- CO3 - Print security documents for given sector.
- CO4 - Produce required 3D printed products.
- CO5 - Print given product using pad printing process.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
325338	SECURITY AND SPECIALITY PRINTING	SSP	DSE	4	-	2	-	6	3	3	30	70	100	40	25	10	25#	10	-	-	150

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Identify type of security documents TLO 1.2 Identify characteristics of security inks TLO 1.3 Elaborate substrate embedded security features	**Unit - I Security Products and Features** 1.1 Need for security printing, special issues, inspection methods, security aspects of currencies, importance of academic and industrial security, types of products. 1.2 Inks - Thermochromic, Fugitive, Bleeding ink, Conductive ink, Visible infrared, Optically Variable Ink (OVI), Photochromic, MICR ink , Invisible Phosphorescent inks (Glow in Dark), UV visible inks. 1.3 Substrate - Security fibers, Security threads, Colour centered paper, Water marks.	Lecture Using Chalk-Board Video Demonstrations Hands-on
2	TLO 2.1 Design press security features for document. TLO 2.2 Use appropriate postpress security features. TLO 2.3 Design security document - cheque on MICR templates. TLO 2.4 Elaborate working of Bar Code, QR Code and RFID cards.	**Unit - II Speciality Features** 2.1 Press - Design the structure of Rainbow printing, Guilloche, Fine Line Printing, Copy, Void, Micro lines, Micro Text, Integrated Text pattern, Latent Image, Diffraction structure. 2.2 Post Press - Designing the structure of Micro foil stamping, Blind embossing, micro perforation, punching. 2.3 MICR cheques coding, MICR template and fonts. 2.4 Bar coding - EAN 13, Code 3ACA, QR code, 3.3 RFID card, Smart cards, Hologram - 2D and 3D, Holographic foiling, Pattern lamination films.	Lecture Using Chalk-Board Video Demonstrations Hands-on
3	TLO 3.1 Identify functioning of printing process for security printing products TLO 3.2 Elaborate applications Digital Printing TLO 3.3 Use innovative printing techniques.	**Unit - III Printing Processes for Security** 3.1 Calibration of printing machines for security jobs. 3.2 Printing processes used - Gravure (Intaglio), Offset, Rotary Letterpress, Rotary Screen. 3.3 Use of digital printing - Variable Data Printing.	Lecture Using Chalk-Board Video Demonstrations Hands-on
4	TLO 4.1 Elaborate working of Additive manufacturing techniques. TLO 4.2 Use appropriate 3D printing techniques. TLO 4.3 Identify 3D printing applications.	**Unit - IV 3D Printing Process** 4.1 Fundamentals of Additive manufacturing techniques. 4.2 Printing Technologies and materials used for - SLA, FDM, LOM,DMLS,Ink Jet and Polyjet. 4.3 3D printer structure, Application sectors of 3D printing.	Video Demonstrations Lecture Using Chalk-Board Model Demonstration
5	TLO 5.1 Elaborate working of pad printer. TLO 5.2 Solve troubles during printing. TLO 5.3 Identify Tampography / Pad printing applications.	**Unit - V Pad Printing Process** 5.1 Pad properties - shape, size, hardness, durability, cliches - materials and use. 5.2 Printer designs and working, Ink types, Troubleshooting related to the pad printing. 5.3 Application sectors of pad printing.	Lecture Using Chalk-Board Model Demonstration Video Demonstrations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs

SECURITY AND SPECIALITY PRINTING **Course Code : 325338**

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Identify minimum 5 security features embedded in given currency note with following restrictions of RBI Guidelines.	1	*List minimum 5 security features embedded in given currency note with following restrictions of RBI Guidelines.	2	CO1
LLO 2.1 Investigate minimum 3 security features embedded in stamp paper, Cheque or Fixed Deposit certificate as per RBI Guidelines	2	Investigate minimum 3 security features embedded in stamp paper, Cheque or Fixed Deposit certificate as per RBI Guidelines	2	CO1 CO2
LLO 3.1 Investigate minimum 3 security features as per RBI Guidelines	3	Investigate minimum 3 security features as per RBI Guidelines	2	CO1 CO2
LLO 4.1 Examine minimum 5 security features embedded in educational certificates.	4	*Examine minimum 5 security features embedded in educational certificates.	2	CO2
LLO 5.1 Design cheque or fixed deposit certificate using software.	5	Design cheque or fixed deposit certificate using software.	2	CO2
LLO 6.1 Design educational certificate having minimum 5 security features using software.	6	*Design educational certificate having minimum 5 security features using software.	2	CO2
LLO 7.1 Demonstrate Post press security feature - micro embossing, micro perforation using die making process	7	*Demonstrate micro embossing and micro perforation processes for security.	2	CO2
LLO 8.1 Design educational certificate including bar code and QR code.	8	Design educational certificate including bar code and QR code.	2	CO2
LLO 9.1 Examine MICR printed products.	9	Examine MICR printed products.	2	CO2
LLO 10.1 Demonstrate hologram making process.	10	*Demonstrate hologram making process.	2	CO2
LLO 11.1 Demonstrate intaglio and rotary letterpress printing process used in security printing.	11	*Demonstrate intaglio and rotary letterpress printing process used in security printing.	2	CO3
LLO 12.1 Print educational Mark sheet or Degree Certificate having minimum 5 Press Security features printed on Offset machine and VDP, Alpha numbering printing using Digital Printing Process	12	Print educational Mark sheet or Degree Certificate having minimum 5 Press Security features printed on Offset machine and VDP, Alpha numbering printing using Digital Printing Process	2	CO3
LLO 13.1 Screen print educational Mark/Certificate with 3 Security Ink features and use digital VDP, Alpha numbering.	13	Screen print educational Mark/Certificate with 3 Security Ink features and use digital VDP, Alpha numbering.	2	CO3
LLO 14.1 Print display object using 3D printer.	14	*Print display object using 3D printer.	2	CO4
LLO 15.1 Demonstrate working of SLA,FDM,LOM,DMLS 3D printers for products.	15	Demonstrate working of SLA,FDM,LOM,DMLS 3D printers for products.	2	CO4
LLO 16.1 Print two colors on any 2 products using pad printing.	16	*Print two colors on any 2 products using pad printing.	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Assignment

- Make video presentation / animation showing application of holograms and their types.
- Collect information about 3D printing products suppliers and its costing available in local market.
- Make video presentation / animation showing printing of Press and Post-Press security features
- Collect information and make video presentation about RFID Card and Smart cards manufacturing process.

Micro project

- Collect information about Pad printing products suppliers available in local market.
- Collect images of minimum 3 Pad printed products and list their application sectors.
- Collect the information of minimum 3 specialtiy printing products suppliers available in local market and enlist minimum 5 security products and their applications
- Collect images of minimum 5 currency notes and enlist their security features and enlist samples of minimum 5 security inks used on different products.
- Collect information about Quality Standard followed for security and speciality printing products

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Eye Glass - min 100x magnification	1,2,3,4,5,6
2	Printer (LaserJet color / Black and white, Print Resolution: 600x600 DPI, Print Speed Black: 18 PPM, Paper Size:A3, A4)	10,11,13,14
3	3 D printer - FDM technology embedded software, with platform and filament spool	14,15
4	Pad printing machine	15,16
5	Densitometer - Dot Area, Dot Gain, Density reading.	3,4,7,9
6	Spectrophotometer - LAB reading, Trapping reading,	5,6,7
7	Flexographic Printing Machine - single colour, Hot air dryer, etc	5,6,7,8,10,11
8	Gravure printing Machine (minimum Two color)	7,8,9,10
9	Digital Eye Glass - 1000x magnification	All
10	Designing software	All
11	Color inspection booth	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Security Products and Features	CO1	12	2	4	6	12
2	II	Speciality Features	CO2	12	4	4	6	14
3	III	Printing Processes for Security	CO3	12	4	6	6	16
4	IV	3D Printing Process	CO4	12	2	6	6	14
5	V	Pad Printing Process	CO5	12	2	6	6	14

SECURITY AND SPECIALITY PRINTING **Course Code : 325338**

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
Grand Total				60	14	26	30	70

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Two unit tests of 30 marks each.
- Each practical will be assessed considering 60% weightage to process and 40% weightage to output.

Summative Assessment (Assessment of Learning)

- End semester theory examination of 70 marks.
- Actual performance in external practical examination of 25 marks.

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	1	2	1	0	3			
CO2	3	1	1	2	1	0	3			
CO3	3	2	3	2	3	0	3			
CO4	3	1	3	2	1	0	3			
CO5	3	1	3	2	1	0	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Richard D Warner, Richard M Adams, Dr. Make Believe	Introduction to Security Printing	Graphic Arts Center Publishing Company; (January 1, 2001), ISBN-13: 978-0883623756
2	Ben Redwood , Filemon Schöffer, Brian Garret	The 3D Printing Handbook: Technologies, design and applications	3D Hubs (November 28, 2017), ISBN 978-90-827485-0-5
3	Lawson Screen & Digital	The Pad Printing Process	Penrose St.Saint Louis, MO 63115, ISBN: 650-156-1-EA
4	Chee Kai Chua, Kah Fai Leong	3D Printing and Additive Manufacturing	World Scientific Publishing Company; Revised ed. edition (October 6, 2014), ISBN-13: 978-9814571418

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=acXIYNqQzKM	Video having Information about Security Printing Sector

SECURITY AND SPECIALITY PRINTING **Course Code : 325338**

Sr.No	Link / Portal	Description
2	https://www.youtube.com/watch?v=iuh_LF-SQjE	Video having Information about Card Manufacturing
3	https://www.youtube.com/watch?v=QAIRqUZ4XFw	Video having Information about Specialty VDP application
4	https://www.youtube.com/watch?v=dq4-KsXKaZs	Video having Information about Security Feature designing
5	https://www.youtube.com/watch?v=Dt6Rb1brnZ0	Video having Information about Specialty inks - Thermochromic ink

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students