Savitribai Phule Pune University
Board of Studies (Printing Technology)
With Effect From 2021-22
Honors* in Advanced Packaging Technology

Year & Semester	Course Code and Title	Teaching Scheme			Examination Scheme and Marks						Total Marks	Credits	
		Th.	Pr.	Tut.	Paper		TW	PR	OR	Presentation		TH/TUT	PR
					In Sem	End Sem							
T.E & V	308211 Internet of Things	04	--	--	30	70	--	--	--	--	100	4	--
	308212 Internet of Things Laboratory	--	02	--	--	--	50	--	--	--	50	--	1
	Total	04	02	--	100		50	--	--	--	150	5	

Year & Semester	Course Code and Title	Teaching Scheme			Examination Scheme and Marks						Total Marks	Credits	
		Th.	Pr.	Tut.	Paper		TW	PR	OR	Presentation		TH/TUT	PR
					In Sem	End Sem							
T.E & VI	308213 Smart Packaging	04	--	--	30	70	--	--	--	--	100	4	--
	Total	04	02	--	100		50	--	--	--	150	4	

Year & Semester	Course Code and Title	Teaching Scheme			Examination Scheme and Marks						Total Marks	Credits	
		Th.	Pr.	Tut.	Paper		TW	PR	OR	Presentation		TH/TUT	PR
					In Sem	End Sem							
B.E & VII	408214 Sustainable Packaging	04	--	--	30	70	--	--	--	--	100	4	--
	408215 Sustainable Packaging Laboratory	--	02	--	--	--	50	--	--	--	50	--	1
	Total	04	02	--	100		50	--	--	--	150	5	

Year & Semester	Course Code and Title	Teaching Scheme			Examination Scheme and Marks						Total Marks	Credits	
		Th.	Pr.	Tut.	Paper		TW	PR	OR	Presentation		TH/TUT	PR
					In Sem	End Sem							
B.E & VIII	408216 Brand and Packaging Management	04	--	--	30	70	--	--	--	--	100	4	--
	408217 Seminar	--	--	02	--	--	--	--	--	50	50	2	--
	Total	04	--	02	100		--	--	--	50	150	6	

Abbreviations: TH: Theory   **PR:** Practical   **TUT:** Tutorial   **TW:** Term Work   **OR:** Oral

T.E Printing Engineering (2019 Pattern), Honours Course
Savitribai Phule Pune University

1. Rules and Regulations for Honors / Minors Programs

R 1.1 It is absolutely not mandatory for any student to opt for the Honors or Minors Program. The choice is given to individual students to undertake Honors/Minors programs from the third-year engineering (Fifth Semester) to fourth-year engineering (Eighth Semester). Honors/Minors programs will be opted from offered programs by SPPU. Once selected he/she will not be permitted to change the Honors/Minors program in forthcoming semesters.

R 1.2 The registration for the Honors/Minors Program will lead to gaining additional credits for such students. The result of the Honors/Minors Program will get reflected in ledgers to be maintained at the university only. After the completion of the Honors/Minors program by concerned students, details of credits earned in the Honors/Minors program be printed in the mark sheet of the eighth semester. For those students, who will not be able to complete the Honors/Minors program, details about the additional credits earned will not get printed.

R 1.3 Credits earned through registration and successful completion of the Honors/Minors Program will not be considered for the calculation of SGPA or CGPA. As per the standard practice, SGPA and CGPA calculations will be done with a common base only by considering mandatory credits assigned for the Bachelor's program as per the structure approved by the Academic Council.

R 1.4 Students once registered for the program need to complete all credits assigned for the specific Honors and Minors Program in the period of 4 years from the Semester-V. Degree with Honors/Minors will be awarded only after the completion of the Honors/Minors Program along with the respective UG program degree. Students may opt to cancel the registration for Honors/Minors within this period of 4 years. After 4 years expire automatically Bachelor's degree will be awarded to such a student provided, he/she has earned the credits needed for graduation.

R 1.5 Backlog Honors/Minors courses will not contribute to the decision of A.T.K.T.

2. Examination Scheme:

R 2.1 Examinations for the Honors/Minors Program will be organized at the University Level. Question papers will be common for all students who had opted/registered for the specific Honors/Minors Program. Evaluation of answer books for the Honors/Minors program will be done at the university level.

R 2.2 Additional examination fees as per prevailing rules and regulations will be charged from those students who had registered for the Honors/Minors Program to match the expenses for paper setting and the assessment of answer books at the CAP Centre.

Instructions:

- Minimum number of Experiments/Assignments in PR/Tutorial shall be carried out as mentioned in the syllabi of respective courses.
- Assessment of tutorial work has to be carried out similar to term-work. The Grade cum marks for Tutorial and Term-work shall be awarded on the basis of continuous evaluation

(308211) Internet of Things		
Teaching Scheme	**Credits**	**Examination Scheme**
Lectures: 4 Hrs./ Week	04	In Sem: 30 Marks
		End Sem: 70 Marks

Pre-requisites: Printing Digital Electronics and Microprocessor & Microcontroller

Course Objectives:

The objective of the course is:

1. To study fundamental concepts of IoT

2. Understand the development board, Arduino

3. Learn the roles of sensors IoT

4. Study the interfacing of sensors and actuators with microprocessor

5. Understand ESP8266 Wi-Fi module different protocols used for IoT design

6. Learn the industry 4.0 and IoT in Printing applications.

Course Outcomes:

On completion of the course, the student will be able to

CO1: Understand the various concepts, terminologies, and architecture of IoT systems

CO2: Compare and use of various development boards Arduino, Raspberry pi

CO3: Implement interfacing of various sensors, actuators to the development boards

CO4: Configure the ESP8266 Wi-Fi module

CO5: Understand the issues and security challenges in IoT

CO6: Understand industry 4.0 version and various I IoT applications

Unit 1: Understanding IoT Fundamentals **[8 hours]**

Introduction of IoT in printing applications, Definitions & Characteristics of IoT, Need of IoT in printing, Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, Internet in IoT, IoT frameworks, IOT Architecture and protocols, Overview of IoT components and Communication Technologies, Challenges in IoT

Unit 2: Introduction to Processors Boards used in IoT **[8 hours]**

Introduction to Processors boards, Arduino, raspberry pie, Arduino Simulation Environment, Arduino Uno Architecture, Setup the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino

Unit 3: Overview of Sensors and Interfacing with Arduino Board for Printing   [8 hours]

Overview of Sensors working, Types of Sensors, Types of Actuators, Examples and Working
Interfacing of Level, Temperature, Humidity, Motion, Light and Gas Sensor with Arduino
Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with
Arduino

Unit 4: Networking with ESP8266 Wi-Fi module   [8 hours]

Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module, Various Wi-Fi
libraries, Web server- introduction, installation, configuration, Posting sensor(s) data to the
webserver

Unit 5: Networking with ESP8266 Wi-Fi module   [8 hours]

Basics of cloud platform, benefits of cloud computing, services and advantages, disadvantages
of each service, Interfacing of ESP8266 Wi-Fi Module with the webserver. Security issues in
IoT and challenges in IoT

Unit 6: Introduction to industry 4.0 and Industrial IoT Case Studies   [8 hours]

Introduction to industry 4.0, Introduction to machine-to-machine communications and Examples
of the industrial IoT implementation in the printing industry, smart city, smart homes, auto
sectors

Text Books:

[T1]   Hakima Chaouchi, The Internet of Things Connecting Objects, to the Web, ISBN: 978-1-
        84821-140-7, Wiley Publications.

[T2]   Olivier Hersent, David Boswarthick, and Omar Elloumi, The Internet of Things: Key
        Applications and Protocols, 1st Edition, VPT, 2014, Wiley Publications

[T3]   Vijay Madisetti and Arshdeep Bahga, ―Internet of Things (A Hands-on-Approach),
        2015, Orient Blackswan Private Limited - New Delhi

[T4]   Samuel Greengard, The Internet of Things, Revised and Updated Edition, 2021, ISBN:
        9780262542623

Reference Books:

[R1]   Daniel Minoli, ―Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications‖, ISBN: 978-1-118-47347-4, Willy Publications

[R2]   Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

[R3]   Nathan Ida, Sensors, Actuators, and Their Interfaces: A multidisciplinary introduction (Control, Robotics, and Sensors, 2011SciTech Publishing Inc, ISBN 978-161353006

Unit	Text Books	Reference Books
Unit 1	T1	R1
Unit 2	T2	R2
Unit 3	-	R3
Unit 4	T3	R1
Unit 5	-	R1, R2
Unit 6	T4	R2, R3

(308212) Internet of Things Laboratory		
Teaching Scheme	**Credits**	**Examination Scheme**
Practical: 2 Hrs./ Week	01	Term Work: 50 Marks

Pre-requisites: Printing Digital Electronics and Microprocessor & Microcontroller

Course Objectives:

The objective of the course is:

1. Understand the development board Arduino and the Use of TinkerCAD
2. Learn the roles of sensors IoT
3. Study the interfacing of sensors and actuators with microprocessor
4. Learn the Interface with NodeMCU wifi
5. Understand the interface of Arduino with Bluetooth communication
6. Study the detailed interface of peripheral I/O devices with IoT

Course Outcomes:

On completion of the course, the student will be able to

CO1: Understand the various concepts, terminologies, and architecture of IoT systems

CO2: Compare and use of various development boards Arduino, Raspberry pi

CO3: Implement interfacing of various sensors, actuators to the development boards

CO4: Configure the ESP8266 Wi-Fi module

CO5: Configure the Bluetooth module

CO6: Implement the interfacing of I/O devices with IoT.

Guidelines for Laboratory Work:

The student shall complete the following hands-on activities as a Term Work under the guidance of the concerned faculty member.

Term Work:

The learner shall complete the following activities as a part of Term-Work:

1. Study of Arduino board.
2. Study of TinkerCAD.
3. Interfacing of Arduino board with temperature sensor
4. Introduction to Node MCU
5. Interfacing with Arduino and Node MCU

6. Setting up the Bluetooth communication with Arduino board and sensor data transmission
7. Study of Node MCU-Blynk-DHT
8. Interfacing of Arduino board with DC or servo motors
9. Interfacing Sensors and actuators with Raspberry Pi 2.
10. Interfacing Printer with IoT

(308213) Smart Packaging		
Teaching Scheme	**Credits**	**Examination Scheme**
Lectures: 4 Hrs./Week	04	In Sem: 30 Marks
		End Sem: 70 Marks

Pre-requisites: Introduction to Packaging Concepts, Packaging Materials, and Processes

Course Objectives:

The objectives of the Course are:

1. Define packaging and describe the need for packaging.
2. Describe the role of non-absorbent and absorbent substrates used in packaging.
3. Define smart packaging and its needs in the industry.
4. Know the use of RFID in packaging applications
5. Learn the use of NFC in packaging applications
6. Understand the practical implementation stages involved in the smart packaging

Course Outcomes:

On successful completion of the course the student will be able to:

1. Learn the concepts and basic requirements of packaging.
2. Know the properties and applications of various raw materials used in packaging.
3. Understand the importance of smart packaging in the industry.
4. Implement RFID in packaging applications
5. Implement NFC in packaging applications
6. Setting up smart packaging solutions in the food or pharma industry.

Unit 1: Introduction to Packaging **[8 hours]**

Need & Evolution of Packaging, Definitions of Packaging, Basic Requirements - Protection, Preservation, Containment, Machinability, Communication, Re-use and Recyclability, Types of Packaging, Packaging Hazards – Storage, Transportation, Chemical, Climatic, Biological.

Unit 2: Raw Materials in Packaging **[8 hours]**

Basic requirements of Packaging, Non-absorbent materials for Packaging such as Cellophane, Polyethylene, Polypropylene, PET A, PET G, Aluminum Foil, PVC, PS, Biodegradable and Eco-friendly Packaging, Absorbent materials such as Paper and Board, Wood, Glass and Metals, Properties, and Applications of the packaging materials.

Unit 3: Basics of Smart Packaging [8 hours]

Introduction to smart packaging, concepts of active and intelligent packaging, need of smart packaging and Key features of smart packaging, Advantages of smart packaging, Types of intelligent packaging, interactive packaging, sensors and indicators-based packaging, selection strategies of intelligent packaging, Implementation examples of the smart packaging in various sectors like food packaging, pharma, and retail sectors.

Unit 4: Introduction to RFID [8 hours]

RFID Principles and components, Types of tags, antenna and readers, Role of RFID in smart packaging, Communication in RFID, types of RFID Wireless Sensor Networks: History and Context, Node, Connecting nodes, Networking Nodes, WSN and IoT

Unit 5: Introduction to Near Field Communications [NFC] [8 hours]

Overview of NFC, Developments of NFC, NFC operating modes, modulation, NFC tag types, data transmission with NFC, programming with NFC, RF measurements, applications of NFC in the printing industry.

Unit 6: Case studies of smart packaging [8 hours]

Detailed studies of Smart packaging in the food industry and pharma industry, needs, and its implementation stages in detail

Text Books:

[T1]   A. S. Athayle, (1992), Plastics in Packaging, Tata McGraw-Hill Publication.

[T2]   A. S. Athayle, (1992), Plastics in Flexible Packaging, Multi-Tech Publishing.

[T3]   S. Natarajan. M. Govindarajan, and B. Kumar, (2009), "Fundamental of Packaging Technology" PHI, New Delhi.

[T4]   Paul Butler, Joseph Kerry, Smart Packaging Technologies for Fast Moving Consumer Goods, 2008, Willy publisher

[T5]   Klaus Finkenzeller; Dorte Muller, RFID Handbook: Fundamentals and Applications in Contactless Smart Cards, Radio Frequency Identification and Near-Field Communication, 2010, Wily telecom

Reference Books:

[R1]   Walter Soroka, (2009), Fundamentals of Packaging Technology, Fourth Edition, Institute of Packaging Professionals.

[R2]   Aaron L. Brody, Kenneth S. Marsh, (1997), Encyclopedia of Packaging Technology, 2nd Edition, A Wiley-Interscience Publication.

[R3]   Panuwat Suppakul, Intelligent Packaging, Chapter in Handbook of Frozen Food Processing and Packaging, 2012, CRC PRESS, DOI:10.1201/b11204-46

[R4]   Sheli McHugh, Near Field Communication: Recent Developments and Library Implications, 2014, Morgan & Claypool

Unit	Text Books	Reference Books
Unit 1	T1, T2, T3	R1, R2
Unit 2	T1, T2, T3	R2
Unit 3	-	R3
Unit 4	T5	R4
Unit 5	T5	-
Unit 6	T4	R3

(408214) Sustainable Packaging		
Teaching Scheme	**Credits**	**Examination Scheme**
Lectures: 4 Hrs./Week	04	In Sem: 30 Marks
		End Sem: 70 Marks

Pre-requisites: Introduction to Packaging Concepts, Packaging Materials, and Processes

Course Objectives:

The objectives of the Course are:

1. To understand packaging materials and types of recycling
2. To set the goals for sustainable packaging
3. To design appropriate packaging for sustainability
4. To understand the concepts of circular economy
5. To assess Packaging Life Cycle
6. To identify marketing and communicating tools for sustainability

Course Outcomes:

On successful completion of the course the student will be able to:

1. To understand rigid and flexible packaging materials and recycling techniques
2. To define sustainable goals, develop products and strategies for sustainability
3. To evaluate different approaches of packaging for sustainability
4. To apply 3R's of a circular economy for waste reduction
5. To calculate the carbon footprint for quantifying packaging life cycle
6. To understand the best practices for sustainability

Unit 1: Packaging and Recycling [8 hours]

Defining Flexible Packaging, Flexible Packaging Categories, Selection Criteria of Flexible Packaging, Benefits of Flexible Plastic Packaging, Flexible Packaging versus Rigid Packaging, Limitations of Flexible Plastic Packaging, Issues with Multi-layer Plastic Packaging, Aluminum, Steel, Glass, Paper and Board, Metals, Recycling, Types of Recycling

Unit 2: Sustainable Packaging [8 hours]

Introduction, Sustainable Goals, Packaging Materials in the Food Industry, Bio-Based and Biodegradable Food Packaging Materials, Renewable Packaging Materials, Edible Food Packaging Materials, Bio-Composites Materials, Food Packaging Sustainability, Sustainable

Product Development, Strategy for Sustainability, Corporate and Brand Positioning, Supply Chain Management,

Unit 3: Designing for Sustainability [8 hours]

Introduction, Effective Packaging, Efficient Packaging, Cyclic Packaging, Safe Packaging, Designing for Effective Packaging, Designing for Efficient Packaging, Designing for Cyclic Packaging, Designing for Safety, Material Selection, Compostable Packaging,

Unit 4: Circular Economy [8 hours]

Key Concepts and Terminology, Linear Economy, Introduction, Need for Circular Economy, Benefits of Circular Economy, 3R's of Circular Economy, Negative Impacts of Plastics, Disposal, and Post-disposal, Waste Management, Plastics in Circular Economy, Business Models, Industry 4.0, and Circular Economy

Unit 5: Life Cycle Assessment in Packaging [8 hours]

Introduction, Need for Life Cycle Assessment, Need for Life Cycle Assessment, Green Packaging, Functions of LCA, Types of Packaging for LCA, Phases, and Processes in LCA, Levels of LCA, Life Cycle Assessment Tools, Issues related to Air Pollution, Landfills, and Marine Pollution, Life Cycle Assessment for Packaging Materials and Food Packaging, Green House Gas Emissions, Carbon Footprint Assessment, Future of LCA

Unit 6: Marketing and Communicating [8 hours]

Marketing Strategy for Sustainability, Understand and Engage with Stakeholders, Understand and Engage with Consumers, Communicating the Messages, Environmental Claims, ISO 14040, ISO 14044, ISO 14064, ISO 14065, ISO 14066

Text Books:

[T1]   Karli Verghese, Helen Lewis, Leanne Fitzpatrick, (2012), Packaging for Sustainability, Springer.

[T2]   Wendy Jedlica, (2009), Packaging Sustainability, John Wiley and Sons

References:

[R 1]   Ricardo Barra, Sunday A. Leonard, (2018), Plastics and Circular Economy

[R 2]   Subramanian SenthilKannan Muthu, (2021), Sustainable Packaging, Springer

[R 3]   McKinsey Center for Business and Environment, (2016), The circular economy: Moving from theory to practice

[R 4] Jon Dettling and Olivier Jolliet, (2010), Life Cycle Assessment and Packaging, PaperCon 2010, TAPPI

[R 5] Umberto Arena, Maria Laura Mastellone and Floriana Perugini, (2003), Life Cycle Assessment of a Plastic Packaging Recycling System, Plastic Packaging Recycling

[R 6] Kun-Mo Lee and Atsushi Inaba, (2006), Life Cycle Assessment Best Practices of ISO 14040 Series

Unit	Text Books	Reference Books
Unit 1	T1,	R1,
Unit 2	T1, T2	R2
Unit 3	T1, T2	R2
Unit 4	T2	R3
Unit 5	T1, T2	R4, R5
Unit 6	T1	R6

(408215) Sustainable Packaging Laboratory		
Teaching Scheme	**Credits**	**Examination Scheme**
Practical: 2 Hrs./Week	01	Term Work: 50 Marks

Pre-requisites: Introduction to Packaging Concepts, Packaging Materials, and Processes

Course Objectives:

The objectives of the Course are:

1. To design different types of packaging

2. To categorize the factors affecting package sustainability for a given product

3. To design a sustainable package for the given product

4. To plan a strategy for distribution system for a package

5. To assess Packaging Life Cycle

6. To identify marketing and communicating tools for sustainability

Course Outcomes:

On successful completion of the course the student will be able to:

1. To design primary, secondary and tertiary packaging for a given product

2. To identify the factors impacting the sustainability of a package for a given product

3. To design either a rigid or flexible sustainable package

4. To analyze the distribution system for a package

5. To evaluate the Packaging Life Cycle for a particular application

6. To calculate the carbon footprint for quantifying packaging life cycle

Guidelines for Laboratory Work:

The student shall complete the following hands-on activities as a Term Work under the guidance of the concerned faculty member.

Term Work:

The learner shall complete the following activities as a part of Term-Work:

1. Design a Primary Package for a given product with software such as Solid Works

2. Design a Secondary Package for a given product with software such as Solid Works

3. Design a Tertiary Package for a given product with software such as Solid Works

4. Package comparison of the same product based on sustainability criteria

5. Design a sustainable package for a given product with software such as Solid Works

6. Strategy for distribution system for a package with software such as TOPS or CAPE
7. Assessment of Packaging Life Cycle for a given application
8. Calculation of greenhouse gas emissions for a product
9. Estimate Emissions for Printing and Packaging
10. Presentation on Bio-degradable and Bio-compostable material

(408216) Brand Centric Packaging Design		
Teaching Scheme	**Credits**	**Examination Scheme**
Lectures: 4 Hrs./Week	04	In Sem: 30 Marks
		End Sem: 70 Marks

Pre-requisites: Print package Layout Design, Advanced Print Package Design Layout, Material Science in Printing and Packaging, Introduction to Packaging Concepts, Advertising, and Multimedia

Course Objectives:

The objectives of the Course are:

1. Acquire the basic knowledge of arriving at Brand Centric Packaging Design.
2. Know the need for Brand Centric Packaging Design.
3. Able to identify requirements for Brand Centric Packaging Design.
4. Learn the approach of creating the Brand Centric Packaging Design.
5. Justify the benefit of the Brand Centric Packaging Design approach.
6. Understand brand strategy/brand design and its signification in packaging design.

Course Outcomes:

On successful completion of the course the student will be able to:

1. Apply the knowledge of the Brand Strategy to the packaging design.
2. Comprehend the parameters to design a Brand Centric Packaging Design solution.
3. Assess the Brand Centric Packaging Design parameters.
4. Develop a design-thinking approach to arrive at a Brand Centric Packaging Design solution.
5. Apply branding knowledge in packaging design.
6. Understand the importance of brand strategy for packaging design.

Unit I: Branding **[8 hours]**

Introduction, Brand Strategy, consider overall business strategy, develop brand positioning, develop messaging strategy, develop brand name, logo, and tagline. Develop brand visual language. Develop Brand manual.

Unit II: Brand Manual   [8 hours]

What is a brand manual? Why is a brand manual important?

The brand manual defines - the use of all graphic signs and their interpretations, such as color, size, typographies, icons, patterns, and textures associated with a brand. It helps establish a strong brand tone of voice (that resonates with the audience, essential for building brand awareness).

Unit III: Visual Language   [8 hours]

What is a Visual Language? How to create a visual language? First, understand the Brand, Get to Know the customer, Identify the Key Attributes that the brand wants to communicate, create signature design elements and design principles.

Unit IV: Packaging Design Brief   [8 hours]

Introduction to the packaging design brief: - Key Elements to a professional packaging design brief: - Understand the client's requirements. Audience Demographics and psychography understanding. The Scope of the Project. Category & Competitor Analysis. Deliverables & Deadlines, Mandatories.

Unit V: Design-Thinking   [8 hours]

Five Stages of Design Thinking methodology; Stage 1: Empathize—research consumers' needs. Stage 2: Define—analyze needs and problems. Stage 3: Ideate—explore creative ideas. Stage 4: Prototype—Create mockups. Stage 5: Test—with prospective consumers your Packaging design Solutions

Unit VI: Mock-up Creation & Testing   [8 hours]

Four Principles: 1. IMPACT: the product visibility on the shelf must be high. 2. RELEVANCE: It must engage with prospective customers. 3. ADVANTAGE: It communicates key brand messages or a point-of-difference (POD) 4. PERSUASIVE QUALITY: It must induce sales

Reference Books:

[R 1]   Natarajan, S., Govindarajan, M., & Kumar, B. (2014). Fundamentals of Packaging Technology. PHI Learning Pvt. Ltd.

[R 2]   Klimchuk, M. R., & Krasovec, S. A. (2013). Packaging design: Successful product branding from concept to shelf. John Wiley & Sons.

[R 3] Brown, S. (2016). Brands and Branding. Sage.

[R 4] DuPuis, S., & Silva, J. (2008). Package Design Workbook: The art and science of successful packaging. Rockport Publishers.

[R 5] Kapferer, J. N. (2012). The New Strategic Brand Management: Advanced Insights and Strategic Thinking. Kogan page publishers.

[R 6] Miller, D. (2017). Building a Story Brand: Clarify your message so customers will listen. HarperCollins Leadership.

[R 7] Szaky, T. (2019). The Future of Packaging: From Linear to Circular. Berrett-Koehler Publishers.

[R 8] Yayici, E. (2016). Design Thinking Methodology Book. Art Biz Tech.

Unit	Reference Books
Unit I	R 3
Unit II	R 5, R 6
Unit III	R 6
Unit IV	R 2, R 7
Unit V	R 8
Unit VI	R 1, R 2

<table>
<tr><td colspan="3" align="center">(408217) Seminar</td></tr>
<tr><td align="center">Teaching Scheme</td><td align="center">Credits</td><td align="center">Examination Scheme</td></tr>
<tr><td align="center">Tutorial: 2 Hrs./Week</td><td align="center">02</td><td align="center">Presentation: 50 Marks</td></tr>
</table>

The seminar is a course requirement wherein under the guidance of a faculty member a student is expected to do an in-depth study on the topic relevant to the latest trends in the field of concerned Honors degree selected by him/her and approved by the authority; by doing literature survey, understanding different aspects of the problem and arriving at a status report in that area. While doing a seminar, the student is expected to learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study concepts, techniques, prevailing results, etc., analyze it, and present a seminar report. It is mandatory to give a seminar presentation before a panel is constituted for the purpose. The grading is done on the basis of the depth of the work done, understanding of the problem, report, and presentation by the student concerned.

Guidelines for the Seminar:

A. Guidelines for Preparation of Report:

- Report should have at least 30 and at most 50 pages.
- The entire pages of the report should be in A4 size strictly, with 1" top and bottom margin and 1.25" left and right margin.
- The entire report should be typed in Times New Roman with **(12 Pt.).**
- Each line should be separated by a **line spacing of 1.5**, **Before, and After as 0**.
- The title and main headings of the paragraphs are to be in bold.
- Report may be divided into the number of chapters as required, with chapter number assigned on the top center and chapter name immediately below it (with 1.5 line spacing) using Times New Roman **(14 Pt. Bold).**
- Every subheading should be given decimal of a whole number of the heading. (e.g., 1.1).
- The complete text should be justified in the report (no left or right aligning).
- No short forms are to be used in the report besides the specified areas.
- Numbering of each figure and table should be done according to the chapter number.
- Numbering of each page should be done in the footer section at the bottom center.

B. List of Contents in the Report:

- The Cover
- Cover Page (Same as The Cover)
- Certificate from Department
- Acknowledgement
- Abstract
- Table of Content
- List of Figures and Tables
- The Report
- References and Appendices.

C. Guidelines for Presentation:

- Report should have at least 30 and at most 50 pages.
- The presentation shall be limited to 15 minutes plus 10 minutes questions and answers. There will be credit for the novelty of the topic, the contents of the seminar, the effectiveness of the presentation, and the way questions and queries are answered.
- Presentations shall be prepared using presentation software like MS PowerPoint. If necessary, use charts, drawings, etc.
- Write only points on the slides (use telegraphic language instead of long sentences). The slides shall NOT be a copy of the text of one's seminar report. Ideally, 6 to 8 lines only shall be there on each slide.
- Equations shall be given in the final form only. Derivations shall be avoided on slides. However, the derivations can be prepared as separate slides with links from the main presentation so that the same can be used if the need arises.
- Use colors to make the slides attractive and to highlight important points. However, remember that the use of too many different colors can make the slides ugly.
- Choose the letter sizes corresponding to the importance of the points. Use bold/ italics type or different colors to stress words or sentences of importance.
- Ensure that all the material presented on slides is legible when projected.
- Reading of the written/typed material or from the slides is not acceptable.