PDPM
Indian Institute of Information Technology,
Design and Manufacturing Jabalpur

Bachelor of Design (B-Des)
Curriculum
April - 2016

Bachelor of Design (B-Des)

Course Structure

PDPM- Indian Institute of Information Technology, Design and Manufacturing Jabalpur
Overview of Bachelor of Design (B-Des) Course Structure: April2016

		Course Name	Lecture	Tutorial	Practical	Contact hours	Credit
Year 1st	Semester I	1. DS 103 Design Fundamentals 1	2	0	2	4	4
		2. DS 104 Design Drawing	1	0	3	4	3
		3. DS 105 Science in Design	2	0	2	4	4
		4. ES 102 Fundamentals of Computing	2	0	3	5	4
		5. HS 101 Communication	1	0	1	2	2
		Total	**8**	**0**	**11**	**19**	**17**
	Semester II	1. DS 101 Engineering Graphics	2	0	3	5	3
		2. DS 106 Design Fundamentals 2	2	0	2	4	4
		3. DS 107 Introduction to Ergonomics in Design	2	0	2	4	4
		4. DS 108 Representation Techniques	2	0	2	4	4
		5. DS 109 Software Skills	0	0	3	3	2
		6. DS 110 Design Project 1	0	0	6	6	4
		Total	**8**	**0**	**18**	**26**	**21**
Year 2nd	Semester III	1. DS 211 Design Arts and Aesthetics	2	0	2	4	4
		2. DS 212 Studies in Form	2	0	2	4	4
		3. DS 213 Design Thinking	2	0	2	4	4
		4. DS 214 Industrial Design 1	2	0	2	4	4
		5. DS 215 Communication Design 1	2	0	2	4	4
		6. DS 216 Design Project 2	0	0	6	6	4
		Total	**10**	**0**	**16**	**26**	**24**
	Semester IV	1. DS 217 Design Research Including User Study	2	0	2	4	4
		2. DS 218 Packaging Design and Branding	2	0	2	4	4
		3. DS 219 Materials and Processes	2	0	2	4	4
		4. DS 220 Industrial Design 2 (Compulsory)	2	0	2	4	4
		5. DS 221 Communication Design 2 (Compulsory)	2	0	2	4	4
		6. DS 222 Design Project 3	0	0	6	6	4
		Total	**10**	**0**	**16**	**26**	**24**
Year 3rd Cont....	Semester V	1. DS 302 Engineering Design- Including Design and Fabrication Project	2	0	4	6	5
		2. DS 323 Service Design	2	0	2	4	4
		3. DS 324 Sustainable Design	2	0	2	4	4
		4. DS 325a Applied Ergonomics (Elective) **OR** DS 325b Visual Ergonomics (Elective)	2	0	2	4	4
		5. DS 326 Design Project 4	0	0	6	6	4
		Total	**8**	**0**	**16**	**24**	**21**

		Course Name	Lecture	Tutorial	Practical	Contact hours	Credit
Year 3rd	Semester VI	1. DS 327 Interface Design	2	0	2	4	4
		2. DS 328 Design Forecasting and Trend Research	2	0	2	4	4
		3. DS 329 Design Management	3	0	1	4	4
		4. DS 330a Industrial Design Elective 1**OR** DS 330b Communication Design Elective 1	2	0	2	4	4
		5. DS 301Computer Aided Process and Planning	2	0	2	4	4
		6. HS 304 Environmental Science	3	0	0	3	4
		Total	**14**	**0**	**9**	**23**	**24**
Year 4th	Semester VII	1. DS 496 Design Seminar 1	0	0	0	1	2
		2.DS 498 Design Thesis1	0	0	0	2	16
		Total	**0**	**0**	**0**	**3**	**18**
	Semester VIII	1. DS 497 Design Seminar II	0	0	0	1	2
		2. DS 499 Design Thesis 2	0	0	0	2	16
		OR 2. Course work (Four Electives)					
		1. DS 431a Industrial Design Elective 2	2	0	2	4	4
		2. DS 431b Industrial Design Elective 3	2	0	2	4	4
		3. DS 431c Industrial Design Elective 4	2	0	2	4	4
		4. DS 431d Industrial Design Elective 5	2	0	2	4	4
		OR					
		1. DS 432a Communication Design Elective 2	2	0	2	4	4
		2. DS 432b Communication Design Elective 3	2	0	2	4	4
		3. DS 432c Communication Design Elective 4	2	0	2	4	4
		4. DS 432d Communication Design Elective 5	2	0	2	4	4
		Total	**8**	**0**	**8**	**19**	**18**

N.B.

- One Lecture = 01 hr.
- One Tutorial = 01 hr.
- One Practical = 01 hr.

Program Credits = 167

Total Program Contact hours = 166

Bachelor of Design (B-Des)

Course Contents

Course Details
Semester -1

Subject Code:	DS 103	**Course Title:**	Design Fundamentals 1
Contact Hours:	L-2, T-0 P-2	**Credit:**	4
Programme :	B. Des	**Semester :**	1
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Introduction to design – Nature of design, Aesthetic sense, Role of perception, Gestalt principle, Inspiration, concepts, problem solving Product integrity (consistency between a product's function with its structure and customer expectations) **[07H Lecture,+3H Lab]**

Originality (originality in technology and form; plagiarism) Craftsmanship required transforming an idea to a product etc. An introduction to basic elements of Design: Point, Line – Line as Expression, Quality of lines, Symbolic Lines, Line as form etc. Space – Pictorial space, implied space, space illusion, actual space etc**.** **[07H Lecture,+3H Lab]**

Shape & Form– Natural shapes, geometric shapes, abstract shapes, non-representational shapes; Natural forms, geometric forms, abstract forms, non-objective forms**.**

[07H Lecture,+3H Lab]

Color – color theory, color properties, color relationships, color harmony, color interaction. Texture - tactile texture, visual texture, texture and pattern, constructed textures, symbolic textures.

[07H Lecture,+3H Lab]

Text/Reference books:

1. Bervin, M. E. (1984). Design Through Discovery: The Element and Principles. Holt, Rinehart and Winston, Washington.
2. Wong, W. (1972). Principles of two-dimensional design. John Wiley & Sons. Sherwin, D. (2010). Creative workshop: 80 challenges to sharpen your design skills. How Books.
3. Brommer, G. F. (1994). Collage techniques: A guide for artists and illustrators. Watson-Guptill Publications.Kelley, T., & Kelley, D. (2013). Creative confidence: Unleashing the creative potential within us all. Crown Business.

Subject Code:	DS 104	**Course Title:**	Design Drawing
Contact Hours:	L-1, T-0, P-3	**Credit:**	3
Programme :	B.Des	**Semester :**	1
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Including a combination of engineering and artistic drawing skills**.** **[07H Lecture,+3H Lab]**

Free hand drawing from natural or manmade environment develops the skill of coordination of mind and hand during the process of representation**.** **[07H Lecture,+3H Lab]**

Free hand drawing of Isometric (30^0-30^0), Diametric (15^0-15^0), Trimetric (45^0-15^0) and One point. **[07H Lecture,+3H Lab]**

Two point and Three point perspective in real location. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Nicolaides, K. (1990). The natural way to draw: A working plan for art study. Houghton Mifflin Harcourt.
2. Laning, E. (1971). The act of drawing. McGraw-Hill Companies.
3. Ching, F. D., &Juroszek, S. P. (2010). Design drawing. John Wiley & Sons.
4. O'Rourke, N., Psych, R., & Hatcher, L. (2013). A step-by-step approach to using SAS for factor analysis and structural equation modelling. SAS Institute.
5. Speed, H. (2012). The practice and science of drawing. Courier Corporation.

Subject Code:	DS 105	**Course Title:**	Science in Design
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	1
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Fundamental Theories of Science. **[07H Lecture,+3H Lab]**

Science behind popular material innovation. **[07H Lecture,+3H Lab]**

Mechanism and Mechanical Devices. **[07H Lecture,+3H Lab]**

Science of Proportion and Geometry, Practical Electronics, Do It Your Self Techniques**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Sclater, N., &Chironis, N. P. (2001). Mechanisms and mechanical devices sourcebook (Vol. 3). New York: McGraw-Hill.
2. Roberts, D. (2010). Making Things Move DIY Mechanisms for Inventors, Hobbyists, and Artists. McGraw Hill Professional.
3. Geier, M. J. (2011). How to Diagnose and Fix Everything Electronic. McGraw-Hill.
4. Scherz, P. (2006). Practical electronics for inventors. McGraw-Hill, Inc.

Subject Code:	ES 102	**Course Title:**	Fundamental of Computing
Contact Hours:	L-2, T-0, P-3	**Credit:**	4
Programme :	B.Des / B. Tech	**Semester :**	1
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Introduction: Basics of operating system, Components of Computer, Memory hierarchy, Number System **[04H]**
Overview of C: Constants, Variables, and Data Types, Operators and Expressions. **[04H]**
Input/ Output: Managing Input and Output Operations, Formatted Input / Output **[02H]**
Decision making & Iterations: Decision Making and Branching, Decision Making and Looping **[02H]**
Advanced topics: Arrays, Character Arrays and Strings, User-Defined Functions **[04H]**
Structures and Unions, Pointers, Dynamic Memory Allocation and Linked Lists **[08H]**
File Management in C, The Pre-processor directives and Header Files, Developing a C Program: Some Guidelines. **[04H]**

Text/Reference books:

1. Balagurusamy, E. (2001). Object Oriented Programming with C++, 6e. Tata McGraw-Hill Education.
2. Kernighan, B.W., and Ritchie, D. (1990). The C Programming Language, 2nd edition, Prentice Hall,
3. Kanitkar, Y. (2008). Let Us C, 8th Edition, Infinity Science Press,

Subject Code:	HS 101	**Course Title:**	Effective Communication
Contact Hours:	L-1, T-0, P-1	**Credit:**	2
Programme :	B.Des / B. Tech	**Semester :**	1
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Why English? ,Effective Communication Skills-2l, Technical English-2l, Technical Reports -5 L, Tender Notices-2l, Holding Meetings-3l, Good Presentation-3l, Group Discussion-2l, Curriculum Vitae (Cv), Or Resume, Bio-Data, Job Application Letter-3l, Interview-2l, Phonetics.-2l, Grammar-1l

Text/Reference books:

1. Developing Communication Skills- Krishna Menon- Macmillan Publication House.
2. Remedial Grammar- F.T. Wood- Macmillan
3. Personality Development and Soft Skills- BarunMitra- Oxford Publication House.
4. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success- Pearson Education

Course Details
Semester -2

Subject Code:	DS 101	**Course Title:**	Engineering Graphics
Contact Hours:	L-2, T-0, P-3	**Credit:**	3
Programme :	B.Des / B. Tech	**Semester :**	2
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Introduction **[02H]**

Lines, Lettering, Sketching, Principle of Dimensioning, Basic geometrical constructions, Scales, Engineering Curves.

Orthographic Projections **[03H]**

Pictorial view, Multi-view, Multi-view Drawing, Terminology, First angle projection and its features, Third angle projections and its features, Symbols, Section lines or hatching, Conversion of pictorial view into orthographic view.

Projections of Points **[02H]**

Location of a point, Conventional representations, Projections of a point located at different locations.

Projections of Lines **[03H]**

Introduction, Orientation of a line, Projections of a line located at different locations, Projections of a line in different angles.

Projection of Solids **[03H]**

Introduction, Classification of solids, Recommended method of labelling, Orientation of solids, Drawing projections of a solid at different orientation of its axis, Identify visible and hidden lines.

Sections of Solids **[02H]**

Introduction, Terminology, Types of section planes, Section by a plane perpendicular to VP, HP and both.

Development of Surface **[02H]**

Introduction, Classification of surfaces, Methods of development, Development of prism, pyramid, cylinders, cone, trays, Applications.

Intersection of Surfaces **[04H]**

Introduction, Engineering Applications, Method of determining the curves of intersection, Types of interpenetrating solids, Intersection by prism, cylinder, pyramid and cone by another solid.

Text/Reference books:

1. Bhatt, N.D. (2006). Engineering Drawing, 49th edition Charoter, Publishing House, .
2. Agrawal, B., and Agrawal, C.M. (2014). Engineering Drawing (2nd Ed), McGraw Hill, New Delhi, .
3. A Jolhe, Dhananjay., (2008). Engineering drawing, TMH, .
4. French, T.E., Vierck, C.J., and Foster, R.J., (1984). Graphic Science and Design, 4th edition, McGraw Hill, .
5. Luzadder, W.J., and Duff, J.M., (1995).Fundamentals of Engineering Drawing, 11th edition, Prentice-Hall of India, .
6. Venugpoal, K., (1998). Engineering Drawing and Graphics, 3rd edition, New Age International,.

Subject Code:	DS 106	**Course Title:**	Design Fundamental 2
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	2
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Understanding of characteristics of different elements & their inter-relationship with various elements and to the composition. **[07H Lecture,+3H Lab]**

Balance – Structural balance and visual balance**.** **[07H Lecture,+3H Lab]**

Materials, hardware and software etc**.** **[07H Lecture,+3H Lab]**

Symmetry, Asymmetry, Radial Balance, Golden proportion, Rules of composition, Scale & Proportion - Unity & Variety – Harmony, Rhythm, Perspective, Emphasis, Orientation, and Repetition. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Bervin, M. E. (1984). Design Through Discovery: The Element and Principles. Holt, Rinehart and Winston, Washington.
2. Wong, W. (1972). Principles of two-dimensional design. John Wiley & Sons.
3. Brommer, G. F. (1994). "Collage techniques: A guide for artists and illustrators" Watson-Guptill Publications.

Subject Code:	DS 107	**Course Title:**	Introduction to Ergonomics in Design
Contact Hours:	L-2, T-0, P-2		
Programme :	B.Des	**Credit:**	4
Pre-requisites:	NIL	**Semester :**	2
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Genesis. Systems concepts, evolution. **[07H Lecture,+3H Lab]**

Components, biomechanics, anthropometry**.** **[07H Lecture,+3H Lab]**

Application, relation to design, ergonomics of product, space and communication **[07H Lecture,+3HLab]**

Sector specific application of ergonomics like craft, agriculture, transportation etc **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Bridger, R. (2008). Introduction to ergonomics. CRC Press.
2. Chakrabarti, D. (1997). Indian anthropometric dimensions for ergonomic design practice. National institute of design.
3. Sanders, M. S., & McCormick, E. J. (1987). Human factors in engineering and design McGraw-HILLBook Company.
4. Woodson, W. E., Tillman, B., & Tillman, P. (1992). Human factors design handbook: information and guidelines for the design of systems, facilities, equipment, and products for human use.

Subject Code:	DS 108	**Course Title:**	Representation Techniques
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	2
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Different ways in design ideas can be represented for better visualization. **[07H Lecture,+3H Lab]**
Development of an analytical attitude and ability to deal with complexity of imagination and visualization of object from any angle. **[07H Lecture,+3H Lab]**
Understanding and representing the structure of forms in detail with wireframes.**[07H Lecture,+3H Lab]**
Color representation in the object drawing with section and exploded view**. [07H Lecture,+3H Lab]**

Text/Reference books:

1. Wood, P., & McDonnell, P. (1994). Scientific illustration: a guide to biological, zoological, and medical rendering techniques, design, printing, and display. John Wiley & Sons.
2. Buxton, B. (2010). Sketching user experiences: getting the design right and the right design: getting the design right and the right design. Morgan Kaufmann.
3. Powell, D. (1990). Presentation techniques. New York: Little, Brown & Company.
4. Tal, D. (2010). Google Sketch up for site design: a guide to modelling site plans, terrain and architecture. John Wiley & Sons.
5. Zeman, N. B. (2014). Essential Skills for 3D Modelling, Rendering, and Animation. CRC Press.

Subject Code:	DS 109	**Course Title:**	Software Skills
Contact Hours:	L-0, T-0, P-3	**Credit:**	2
Programme :	B.Des	**Semester :**	2
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Software skills related to communication design, specially related to some specific software's used in visual prototyping, film making, creating special effects.

Text/Reference books:

1. Macario, J. (2008), Graphic Design Essentials: Skills, Software and Creative Solutions, Pearson Publications.
2. Henry, K. (2012), Drawing for Product Designers (Portfolio Skills), Laurence King Publishing.
3. Eissen, K. (2014), Sketching: Product Design Presentation. BIS Publishers, B.V.

Subject Code:	DS 110	**Course Title:**	Design Project 1
Contact Hours:	L-0, T-0, P-6	**Credit:**	4
Programme :	B.Des	**Semester :**	2
Pre-requisites:	NIL		
Evaluation scheme	Minor project (20%), Major project (30%), Weekly assignment (50%)		

Course Details
Semester -3

Subject Code:	DS 211	**Course Title:**	Design Arts and Aesthetics
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Origin of aesthetic and generate the value system, major contribution of aesthetic in art and design. **[07H Lecture,+3H Lab]**

Social and intellectual development through art. **[07H Lecture,+3H Lab]**

Development of different styles in creative and expressive field of human emotions. **[07H Lecture,+3H Lab]**

Design history of Bauhaus, Ulm school, Scandinavian design, Design and Art in post-modernism period, Holistic contribution of Indian art and design. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Bergson, H. (1983). Creative evolution. University Press of America.
2. Sparke, P. (2013). An introduction to design and culture: 1900 to the present. Routledge.
3. H. Kumar Vyas (2007) "Design the International Movement with Indian Parallel".)
4. Robert Bone (2002) "Art and Design Fundamentals".
5. De Witt H. Parker (2001) "The principle of Aesthetics".

Subject Code:	DS 212	**Course Title:**	Studies in Form
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Simple geometric form, complex forms, nature and form, human figure, space and form, color and form etc. **[07H Lecture,+3H Lab]**

To appreciate and articulate the language of form, to sensitize students towards manipulation of forms in 2D and 3D also Form integration and transition. **[07H Lecture,+3H Lab]**

Experiment with different aspect of forms; understand nature and structure of form, basic techniques of Form. **[07H Lecture,+3H Lab]**

Manipulation and their applications to generate Forms and Shapes with desirable objects. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Hann, M. (2013). Structure and Form in Design: Critical Ideas for Creative Practice. A&C Black.
2. Warell, A. (2001). Design Syntactics: A functional approach to visual product form Theory, Models, and Methods. Chalmers University of Technology.
3. Boden, M. A. (2012). Creativity and art: three roads to surprise.

Subject Code:	DS 213	**Course Title:**	Design Thinking
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Design history, how design thinking is different from technical thinking. **[07H Lecture,+3H Lab]**
What is Design Thinking, Styles of Design Thinking**?** **[07H Lecture,+3H Lab]**
Goal Seeking & Setting Research, Understanding Context, Visual Mapping & Resource Mapping, Categories and Trends Compositions and Judgments**.** **[07H Lecture,+3H Lab]**
Opportunity Mapping and Scenario Visualization, Communications and Reflection, Presentations with Business Models**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Rowe, P. G. (1991). Design thinking. MIT press.
2. Lockwood, T. (2010). Design thinking: Integrating innovation, customer experience, and brand value. Sky horse Publishing, Inc.
3. Plattner, H., Meinel, C., &Leifer, L. (Eds.). (2010). Design thinking: Understand–improve–apply. Springer Science & Business Media.
4. Schneider, J., &Stickdorn, M. (2011). This is service design thinking: basics, tools, cases. Wiley.

Subject Code:	DS 214	**Course Title:**	Industrial Design 1
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Simple products, product color and aesthetics. **[07H Lecture,+3H Lab]**
Simple products, Design from consumers point of view, product language**.** **[07H Lecture,+3H Lab]**
Aesthetic aspect, functionality, product semantic, meaning of sign and symbol, product analysis, product form and psychology**.** **[07H Lecture,+3H Lab]**
White goods, medical products, complex products etc. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Heufler, G. (2004). Design basics. NiggliVerlag.
2. Bramston, D. (2010). Basics Product Design 03: Visual Conversations (Vol. 3). AVA Publishing.
3. Bramston, D. (2008). Basics Product Design 01: Idea Searching (Vol. 1). AVA Publishing.
4. Cuffaro, D&Zaksenberg, I (2013) The Industrial Design Reference & Specification Book.

Subject Code:	DS 215	**Course Title:**	Communication Design 1
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Communication basics, semiotics, semantics, and typography and: Introduction to Communication Design. **[07H Lecture,+3H Lab]**

Effective Communication, Human Perception, Aesthetics, Emotion and Subjectivity, Visual Perception and Cognition: Human Eye, Optical Illusion, Color Perception, Depth Perception, Motion Perception. **[07H Lecture,+3H Lab]**

Visual Language: Semiotics - Semantics, Syntactic, Pragmatics, Sign - Design of Icon, Index, Symbol and Logo. Visual Hierarchy: Visual Focal, Visual Order, Eye Movement, Visual Flow and Continuity, Visual Composition. **[07H Lecture,+3H Lab]**

Information Design: Information Chunking, Grids, Visual Abstraction of Quantitative information, Application of Gestalt Laws of grouping, Information Graphics**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Malamed, C. (2011). Visual language for designers: principles for creating graphics that people understand. Rockport Pub.
2. Arnheim, R. (1969). Visual thinking. Univ of California Press.
3. Bertin, J. (1981). Graphics and graphic information processing. Walter de Gruyter.
4. Barry, A. M. (1997). Visual intelligence: Perception, image, and manipulation in visual communication. SUNY Press
5. Meirelles, I. (2013). Design for information: an introduction to the histories, theories, and best practices behind effective information visualizations. Rockport publishers.
6. Krum, R. (2013). Cool infographics: Effective communication with data visualization and design. John Wiley & Sons.

Subject Code:	DS 216	**Course Title:**	Design Project 2
Contact Hours:	L-0, T-0, P-6	**Credit:**	4
Programme :	B.Des	**Semester :**	3
Pre-requisites:	NIL		
Evaluation scheme	Minor project (20%), Major project (30%), Weekly assignment (50%)		

Course Details
Semester -4

Subject Code:	DS 217	**Course Title:**	Design Research Including user Study
Contact Hours:	L-2, T-0, P-2		
Programme :	B.Des	**Credit:**	4
Pre-requisites:	NIL	**Semester :**	4

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Qualitative and qualitative research methodology, **[07H Lecture,+3H Lab]**
Questionnaire design, validation, repeatability testing, psychophysical scales**, [07H Lecture,+3H Lab]**
Direct observation and activity analysis, photography as a tool in design research etc. **[07H Lecture,+3H Lab]**
Persona, scenario, story boarding. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Laurel, B. (2003). Design research: Methods and perspectives. MIT press.
2. Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J., &Wensveen, S. (2011). Design research through practice: From the lab, field, and showroom. Elsevier.
3. Creswell, J. W., & Clark, V. L. P. (2007). Designing and conducting mixed methods research.
4. Creswell, J. W. (2013). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

Subject Code:	DS 218	**Course Title:**	Packaging Design and Branding
Contact Hours:	L-2, T-0, P-2		
Programme :	B.Des	**Credit:**	4
Pre-requisites:	NIL	**Semester :**	4

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Global Packaging Branding and Promotion**. [07H Lecture,+3H Lab**]
Digital Image Manipulation Applications. **[07H Lecture,+3H Lab]**
Packaging Research and conceptualization, Packaging Design Approaches and Techniques. **[07H Lecture,+3H Lab]**
Packaging Design Realization, Packaging Form and Elements. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Van Roojen, P., &Hronek, J. (2010). Basic Packaging. Pepin Press.
2. Denison, E., &Ren, G. Y. (2001). packaging prototypes 3: Thinking Green (Vol. 3). RotoVision.
3. Pecht, M. (1991). Handbook of electronic package design (Vol. 76). CRC Press.
4. Bringhurst, R. (1992). The elements of typographic style (Vol. 127). Point Roberts: Hartley & Marks.

Subject Code:	DS 219	**Course Title:**	Materials and Processes
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	4
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Importance of Material in Design, Conventional Materials in Design. **[07H Lecture,+3H Lab]**
Material Science and Material Affordance in Product Design**.** **[07H Lecture,+3H Lab]**
Manufacturing of Materials; Material Formation; Shaping and Joining**.** **[07H Lecture,+3H Lab]**
Emerging Materials; Sustainable Materials and Processes; Material Experience in Design **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Ashby, M. F., & Johnson, K. (2013). Materials and design: the art and science of material selection in product design. Butterworth-Heinemann.
2. Lefteri, C. (2007). Making it: Manufacturing techniques for product design. Laurence King.
3. Ulrich, K. T. (2003). Product design and development. Tata McGraw-Hill Education.

Subject Code:	DS 220	**Course Title:**	Industrial Design 2
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	4
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Complex products, design as a strategic tool, design and innovation, design process, user study, need identification. **[07H Lecture,+3H Lab]**
Sigma analysis of user and product activity, usability, material analysis, visual analysis, factor analysis. **[07H Lecture,+3H Lab]**
Physiology analysis, technical analysis, environmental analysis, economic analysis, ideation, analogies, selection of an idea, detail design**,** **[07H Lecture,+3H Lab]**
Design for culture, design for manufacture, design for assembly, product rendering, mock-up and prototype, final manufacture**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Cross, N. (2008). Engineering design methods: strategies for product design. John Wiley & Sons.
2. Whitten, J. L., Barlow, V. M., & Bentley, L. (1997). Systems analysis and design methods. McGraw-Hill Professional.
3. Cuffaro, D., &Zaksenberg, I. (2013). The Industrial Design Reference & Specification Book: Everything Industrial Designers Need to Know Every Day. Rockport Publishers.
4. Krippendorff, K. (2005). The semantic turn: A new foundation for design. crc Press.

Subject Code:	DS 221	**Course Title:**	Communication Design 2
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	4
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Introduction to Print Media: Forms of Printing, History and Evolution Interrelation of Print and Digital Technologies, Applications. Introduction to Typography**:** **[07H Lecture,+3H Lab]**
History and Evolution, Classification, Anatomy, Legibility Readability, Word mark Design, Type Design Principles, Techniques and Applications. **[07H Lecture,+3H Lab]**
Introduction to Photography: History and Evolution, Camera Principles, Techniques and Applications. Introduction to Moving pictures: History and Evolution of Cinema, Video and Animation; Principles Techniques and Applications. Visual Identity Design**:** **[07H Lecture,+3H Lab]**
Introduction to Identity Design, Branding and Rebranding; Applications in - Stationary Design, Template Design, Souvenir Design, Signage Design and Web Design. Introduction to Human Computer Interface: Graphic User Interface, Characteristics, Principles and Applications**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Kipphan, H. (2001). Handbook of print media: technologies and production methods. Springer Science & Business Media.
2. Kernan, A. B. (1987). Printing Technology, Letters, & Samuel Johnson. Princeton University Press.
3. McLean, R. (1988). The Thames and Hudson manual of typography.
4. Craig, J. (1990). Basic Typography: a design manual. Watson-Guptill Publications.

Subject Code:	DS 222	**Course Title:**	Design Project 3
Contact Hours:	L-0, T-0, P-6	**Credit:**	4
Programme :	B.Des	**Semester :**	4
Pre-requisites:	NIL		
Evaluation scheme	Minor project (20%), Major project (30%), Weekly assignment (50%)		

Course Details
Semester -5

Subject Code:	DS 302	**Course Title:**	Engineering Design - Including Design and Fabrication Project
Contact Hours:	L-2, T-0, P-4	**Credit:**	5
Programme :	B.Des /B.Tech	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Introduction to Engineering Design: **[06H]**
Importance of Design, Design Philosophy, History of Design, Design Paradigm, the Design Process, Good Design, Engineering Analysis, Design phases, Product and Process Cycle.

Need Identification and Problem Definition: **[06H]**
Identifying customer needs, Benchmarking, Quality Function Deployment, Engineering Design Specification

Concept Design: **[06H]**
Creativity and Problem Solving, Functional requirements, Product Component Decomposition, Product Function Decomposition, Conceptual Decomposition, Generating Design Concepts, Product Form and Geometry, Product Aesthetics, Evaluating alternative Concepts, Theory of Inventive Problem Solving, Axiomatic Design, Concept Evaluation Methods, Decision Making.

Embodiment Design: **[06H]**
Introduction, Product Architecture, Configuration Design, Parametric Design, Best Practices, Industrial Design, Human Factors Design, Design For X (DFX) - Function, Assembly, Manufacture, Environment, Robustness, Reliability, Recyclability, etc.

Materials Selection: **[08H]**
Performance Characteristics of Materials, the Material Selection Process, Economics of Materials, Material Selection Methods.

Selection of Manufacturing Processes: **[04H]**
Manufacturing Processes, Costs of Manufacturing, Process Selection.

Text/Reference books:

1. Ulrich, Karl.T. and Eppinger, Steven.D.(2012). Product Design and Development, McGraw-Hill
2. Buede, Dennis.M. (2009). The Engineering Design of Systems: Models and Methods, John Wiley & Sons inc

Subject Code:	DS 323	**Course Title:**	Service Design
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Provides insights into the relationships between people, technology (in the broadest sense of the word - paper is a technology) and design. **[07H Lecture,+3H Lab]**

Using cultural and design theories as frameworks it explores through hands-on design projects and case studies the ways in which service design practices creatively engage with new trends in society**.** **[07H Lecture,+3H Lab]**

The ways in which technologies change society, and the ways in which people (users) shape design practices.

[07H Lecture,+3H Lab]

Reconsider designers and users as the ultimate authors of all new designs, technologies or services.

[07H Lecture,+3H Lab]

Text/Reference books:

1. ERL, T. (2008). SOA: principles of service design (Vol. 1). Upper Saddle River: Prentice Hall.
2. This is service design thinking: Basics, tools, cases. BIS, 2012.
3. Macintyre, M., Parry, G., & Angelis, J. (Eds.). (2011). Service design and delivery. Springer Science & Business Media.

Subject Code:	DS 324	**Course Title:**	Sustainable Design
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Sustainable design principles. **[07H Lecture,+3H Lab]**

Physical, mental, spiritual, cultural, social, ethical and economic issues in designing for sustainability. **[07H Lecture,+3H Lab]**

Ecological footprints, ecosystem impact. Waste, reuse and recycling, benign emissions, green design, integrated DFE/Eco design, **[07H Lecture,+3H Lab]**

Design for sustainability, eco innovation, system-wide product/service strategies, sustainable consumption, health, modeling and mapping**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Williams, D. E. (2007). Sustainable design: Ecology, architecture, and planning. John Wiley & Sons.
2. Bhamra, T., &Lofthouse, V. (2007). Design for sustainability: a practical approach. Gower Publishing, Ltd.
3. Vallero, D. A., &Brasier, C. (2008). Sustainable design: the science of sustainability and green engineering. John Wiley & Sons

Subject Code:	DS 325a	**Course Title:**	Applied Ergonomics (Elective)
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Ergonomics in transportation design**,** **[07H Lecture,+3H Lab]**
Medical equipment design**,** **[07H Lecture,+3H Lab**]
Ergonomics in toy and game design**.** **[07H Lecture,+3H Lab]**
Ergonomic principles in developing pleasurable products etc. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Burke, M. J. (1991). Applied ergonomics handbook. CRC Press.
2. Karwowski, W., &Marras, W. S. (Eds.). (1998). The occupational ergonomics handbook. CRC Press.
3. Duffy, V. G. (Ed.). (2008). Handbook of digital human modelling: Research for applied ergonomics and human factors engineering. CRC press.

Subject Code:	DS 325b	**Course Title:**	Visual Ergonomics (Elective)
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Visual ergonomic principles**,** **[07H Lecture,+3H Lab]**
Ergonomics in typography**.** **[07H Lecture,+3H Lab]**
Ergonomics in cartography. **[07H Lecture,+3H Lab]**
Ergonomics in information design. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Anshel, J. (Ed.). (2005). Visual ergonomics handbook. CRC Press.
2. Anshel, J. (2002). Visual ergonomics in the workplace. CRC Press.
3. Woodson, W. E., Tillman, B., & Tillman, P. (1992). Human factors design handbook: information and guidelines for the design of systems, facilities, equipment, and products for human use.

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Subject Code:	DS 326	**Course Title:**	Design Project 4
Contact Hours:	L-0, T-0, P-6	**Credit:**	4
Programme :	B.Des	**Semester :**	5
Pre-requisites:	NIL		
Evaluation scheme	Minor project (20%), Major project (30%), Weekly assignment (50%)		

Course Details
Semester -6

Subject Code:	DS 327	**Course Title:**	Interface Design
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	6
Pre-requisites:	NIL		

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Interface design basics, **[07H Lecture,+3H Lab]**
Interface and interaction, components **[07H Lecture,+3H Lab]**
Usability principles. **[07H Lecture,+3H Lab]**
Application of interface design in product and space. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Tidwell, J. (2010). Designing interfaces. "O'Reilly Media, Inc.".
2. Stone, D., Jarrett, C., Woodroffe, M., &Minocha, S. (2005). User interface design and evaluation. Morgan Kaufmann.
3. Baumann, K., & Thomas, B. (2002). User interface design of electronic appliances. CRC Press.

Subject Code:	DS 328	**Course Title:**	Design Forecasting and Trend Research
Contact Hours:	L-2, T-0, P-2		
Programme :	B.Des	**Credit:**	4
Pre-requisites:	NIL	**Semester :**	6

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Competitor product analysis**,** **[07H Lecture,+3H Lab]**
Future trends, **[07H Lecture,+3H Lab]**
Patent Search / Review of IP**,** **[07H Lecture,+3H Lab]**
International developments study and, new materials and processes review. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Raymond, M. (2010). The trend forecaster's handbook. Laurence King.
2. Kahn, K. B. (2010). New-Product Forecasting. John Wiley & Sons, Ltd.
3. Mendelsohn, L. B. (2000). Trend forecasting with technical analysis.

Subject Code:	DS 329	**Course Title:**	Design Management
Contact Hours:	L-3, T-0, P-1	**Credit:**	4
Programme :	B.Des	**Semester :**	6
Pre-requisites:	NIL		

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Skills, knowledge and learning style evaluation, personal goal setting and professional development planning. **[07H Lecture,+3H Lab]**

Insight into the context that businesses and organizations operate in, how they view and use design, and their relationship with designers. **[07H Lecture,+3H Lab]**

Examine the roles of design and innovation in achieving organizational objectives . **[07H Lecture,+3H Lab]**

To bring together the languages of design and business, it considers organizational objectives, how design and innovation deliver value and return on investment is evaluated**.** **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Best, K. (2006). Design management: managing design strategy, process and implementation. AVA publishing.
2. Cooper, R., Junginger, S., & Lockwood, T. (Eds.). (2013). The handbook of design management. A&C Black.
3. Martin, R. L. (2009). The design of business: Why design thinking is the next competitive advantage. Harvard Business Press.

Subject Code:	DS 330a	**Course Title:**	Industrial Design (Elective 1)
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	6
Pre-requisites:	NIL		

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Industrial design application in furniture design. **[07H Lecture,+3H Lab]**

Industrial design application in interior and space design. **[07H Lecture,+3H Lab]**

Industrial design application in transportation design**.** **[07H Lecture,+3H Lab]**

Industrial design application in display and control design. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Arden, P. (2003). It's not how good you are, it's how good you want to be. Phaidon.
2. Hirschberg, J. (1999). The creative priority: Putting innovation to work in your business.
3. Cross, N. (2008). Engineering design methods: strategies for product design. John Wiley & Sons.

OR

Subject Code:	DS 330b	**Course Title:**	Communication Design (Elective 1)
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	6
Pre-requisites:	NIL		

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

Communication design application in furniture design. **[07H Lecture,+3H Lab]**
Communication design application in interior and space design. **[07H Lecture,+3H Lab]**
Communication design application in transportation design. **[07H Lecture,+3H Lab]**
Communication design application in display and control design. **[07H Lecture,+3H Lab]**

Text/Reference books:

1. Williams, R., & Newton, J. (2009). Visual communication: integrating media, art, and science. Routledge.
2. Worth, S., & Gross, L. P. (1981). Studying visual communication (pp. 134-147). L. P. Gross (Ed.) Philadelphia: University of Pennsylvania Press
3. Baldwin, J., & Roberts, L. (2006). Visual communication: from theory to practice. Ava Publishing.

Subject Code:	DS 301	**Course Title:**	Computer Aided Process and Planning
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	6
Pre-requisites:	NIL		

Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)

1. **Introduction to Manufacturing**: Basic taxonomy of manufacturing, types of manufacturing, discrete versus continuous manufacturing, design for manufacturing, material processing, material planning, process planning, Group Technology
2. **Part design and representation**: Engineering Design, Design drafting, Computer-aided design
3. **Introduction to CAD:** CAD architecture, CAD hardware, CAD software, CAD systems example, Fundamentals of Geometrical Modelling and Solid Modelling, CAD/CAM data exchange.
   [14H Lecture ,+14H Lab]
4. **Process Engineering**: Experience-based planning, decision logic, decision table and decision tree, process capability analysis
5. **Process planning:** Introduction, manual process planning, Variant process planning, and Generative process planning.
6. **Computer-aided process planning systems:** Generalized CAPP model, implementation considerations, Examples of process planning systems. **[14H Lecture,+14H Lab]**

Text/Reference books:

1. Chang, T. C., &Wysk, R. A. (1984). An introduction to automated process planning systems. Prentice Hall Professional Technical Reference.
2. Groover, M. P. (2007). Automation, production systems, and computer-integrated manufacturing. Prentice Hall Press.
3. Chang, T. C., Wysk, R. A., & Wang, H. P. (1991). Computer-aided manufacturing (pp. 486-515). Englewood Cliffs, New Jersey: Prentice Hall.

Subject Code:	HS 304	**Course Title:**	Environmental Science
Contact Hours:	L-3, T-0, P-0	**Credit:**	4
Programme :	B.Des/B.Tech	**Semester :**	6
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Unit 1 : Multidisciplinary nature of environmental studies [2H]

Definition, scope and importance

Need for public awareness. **[**

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

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

- Role of an individual in conservation of natural resources.
- Equitable use of resoureces for sustainable lifestyles. **[08H]**

Unit 3 : Ecosystems

Concept of an ecosystem.

- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids. **[06H]**

Unit 4 : Biodiversity and its conservation

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.

Inida as a mega-diversity nation.

- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. **[08H]**

Unit 5 : Environmental Pollution

Definition

- Cause, effects and control measures of :-
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Diaster management : floods, earthquake, cyclone and landslides. **[08H]**

Unit 6 : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rahabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness. **[07H]**

Unit 7 : Human Population and the Environment

a. Population growth, variation among nations.
b. Population explosion – Family Welfare Programme.
c. Environment and human health.
d. Human Rights.
e. Value Education.
f. HIV/AIDS.
g. Women and Child Welfare.
h. Role of Information Technology in Environment and human health.
i.Case Studies. **[06H]**

Unit 8 : Field work

a. Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
b. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
c. Study of common plants, insects, birds.
d. Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours) **[05H]**

Text/Reference books:

1. Agarwal, K.C. (2001). Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
3. Brunner, R.C., (1989), Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. (1993). Water in crisis, Pacific Institute for Studies in Dev.,Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay NaturalHistory Society, Bombay (R)
10. Heywood, V.H & Waston, R.T. (1995). Global Biodiversity Assessment.Cambridge Univ. Press 1140p.
11. Jadhav, H & Bhosale, V.M. (1995). Environmental Protection and Laws.Himalaya Pub. House, Delhi 284 p.
12. Mckinney, M.L. & School, R.M. (1996). Environmental Science systems &Solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. (1971). Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
16. Rao, M N. & Datta, A.K. (1987). Waste Water treatment. Oxford & IBH Publ.Co. Pvt. Ltd. 345p.
17. Sharma, B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
18. Survey of the Environment, The Hindu (M)

Course Details
Semester -7

Subject Code:	DS 496	**Course Title:**	Design Seminar 1
Contact Hours:	L-0, T-0, P-0	**Credit:**	2
Programme :	B.Des	**Semester :**	7
Pre-requisites:	NIL		
Evaluation scheme	Presentation (15%), Problem Identification (30%), Time management (15%), Design solution (40%)		

Subject Code:	DS 498	**Course Title:**	Design Thesis 1
Contact Hours:	L-0, T-0, P-0	**Credit:**	16
Programme :	B.Des	**Semester :**	7
Pre-requisites:	NIL		

Students in this semester would take up a technically complex project. Example designing a coffee vending machine, packaging for life saving drugs etc. The students can do design thesis in-house but it would be advisable for them to go to industry/ design firms to do the thesis.

Course Details
Semester -8

Subject Code:	DS 497	**Course Title:**	Design Seminar 2
Contact Hours:	L-0, T-0, P-0	**Credit:**	2
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme | Presentation (15%), Problem Identification (30%), Time management (15%), Design solution (40%)			
Students give a seminar in an area in which they want to pursue their thesis.			

Subject Code:	DS 499	**Course Title:**	Design Thesis 2
Contact Hours:	L-0, T-0, P-0	**Credit:**	16
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
The students would have an option of carrying forward their Design Thesis in Industry for one more semester or to come back to the Institute and do course work in lieu of Design Thesis.			

OR

(Course work four electives)

Subject Code:	DS 431a	**Course Title:**	Industrial Design Elective 2
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Industrial design application for physically challenged. **[14H Lecture,+6H Lab]**
Industrial design application in internal security eg. Counter terrorism etc**.** **[14H Lecture,+6H Lab]**

Text/Reference books:

1. Maeda, J. (2006). The Laws of Simplicity (Simplicity: Design, Technology, Business, Life).
2. Gershenfeld, N. (2008). Fab: the coming revolution on your desktop--from personal computers to personal fabrication. Basic Books.
3. Cross, N. (2008). Engineering design methods: strategies for product design. John Wiley & Sons.

Subject Code:	DS 431b	**Course Title:**	Industrial Design Elective 3
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Industrial design application for elderly. **[14H Lecture,+ 6 H Lab]**
Industrial design application in sports. **[14H Lecture,+ 6 H Lab]**

Text/Reference books:

1. Cullen, C. D., & Haller, L. (2004). Design Secrets: Product 2. Rockport Publishers.
2. Hudson, J. (2008). Process: 50 product designs from concept to manufacture. Laurence King.
3. Carstens, D. Y. (1993). Site planning and design for the elderly: Issues, guidelines, and alternatives. John Wiley & Sons.

Subject Code:	DS 431c	**Course Title:**	Industrial Design Elective 4
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Industrial design application in medical equipment and hospital design. **[14H Lecture,+6H Lab]**
Industrial design application for armed forces. **[14H Lecture,+6H Lab]**

Text/Reference books:

1. Arden, P. (2003). It's not how good you are, it's how good you want to be. Phaidon.
2. Cross, N. (2008). Engineering design methods: strategies for product design. John Wiley & Sons.
3. El Haggar, S. (2010). Sustainable industrial design and waste management: cradle-to-cradle for sustainable development. Academic Press.

Subject Code:	DS 431d	**Course Title:**	Industrial Design Elective 5
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Industrial design in education: application areas. **[14H Lecture,6H Lab]**
Industrial design and interactive learning in corporate world. **[14H Lecture,6H Lab]**

Text/Reference books:

1. Reinertsen, D. (1997). Managing the design factory. Simon and Schuster.
2. Shimizu, Y. (1990). Creative marker techniques in combination with mixed media. Graphic-sha Publishing.
3. Cross, N. (2008). Engineering design methods: strategies for product design. John Wiley & Sons.

OR

(Course work four electives)

Subject Code:	DS 432a	**Course Title:**	Communication Design Elective 2
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Communication design application for physically challenged. **[14H Lecture,+6H Lab]**
Communication design application in internal security e.g. Counter terrorism etc**. [14H Lecture,+6H Lab]**

Text/Reference books:

1. Noble, I., &Bestley, R. (2011). Visual research: An introduction to research methodologies in graphic design. A&C Black.
2. Rose, G. (2012). Visual methodologies: An introduction to researching with visual materials. Sage.
3. Kipphan, H. (2001). Handbook of print media: technologies and production methods. Springer Science & Business Media.

Subject Code:	DS 432b	**Course Title:**	Communication Design Elective 3
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Communication design application for elderly. **[14H Lecture,+6H Lab]**
Communication design application in sports. **[14H Lecture,+6H Lab]**

Text/Reference books:

1. Love, L. D. A Guide to Creating Iconic Brand Identities.
2. Lauer, D., &Pentak, S. (2011). Design basics. Cengage Learning.
3. Mandel, T. (1997). The elements of user interface design (Vol. 20). New York: Wiley.

Subject Code:	DS 432c	**Course Title:**	Communication Design Elective 4
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Communication design application in medical equipment and hospital design**. [14H Lecture,+6H Lab]**
Communication design application for armed forces. **[14H Lecture,6H Lab]**

Text/Reference books:

1. Resnick, E. (2003). Design for communication: Conceptual graphic design basics. John Wiley & Sons.
2. Berryman, G. (1984). Notes on graphic design and visual communication. W. Kaufmann.
3. Love, L. D. A Guide to Creating Iconic Brand Identities.

Subject Code:	DS 432d	**Course Title:**	Communication Design Elective 5
Contact Hours:	L-2, T-0, P-2	**Credit:**	4
Programme :	B.Des	**Semester :**	8
Pre-requisites:	NIL		
Evaluation scheme	Quiz I (15%), Midterm (30%), Quiz II (15%), End term (40%)		

Communication design in education: application areas. **[14H Lecture,6H Lab]**
Communication design and interactive learning in corporate world**.** **[14H Lecture,6H Lab]**

Text/Reference books:

1. "Signs and Symbols: Their Design and Meaning (Paperback)" by Adrian Frutiger, Andrew Bluhm (Translator)
2. "The Art of Looking Sideways"by Alan Fletche
3. Graham, Lisa. "Basics of design: Layout & Typography for beginners". Cengage Learning, 2005.
4. Williams, Richard. "The Animator's Survival Kit: A Manual of Methods, Principles and Formulas." (2001).