

University of Mumbai



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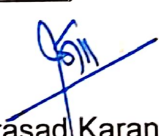
CIRCULAR:-

Sub :- Bachelor of Design (Industrial Design).

All the Principals of the Affiliated Colleges, the Heads of the University Departments and Directors of the recognized Institutions in Faculty of **Science & Technology** are hereby informed that the recommendations passed by the Board of Deans at its meeting held on **27th October, 2023** vide item No. **6.11 (N)** have been accepted by the Academic Council at its meeting held on **1st November, 2023**, vide item No. **6.11 (N)** and subsequently approved by the Management Council at its meeting held on **20th November, 2023** vide item No. **7** and that in accordance therewith, in exercise of the powers conferred upon the Management Council under Section 74(4) of the Maharashtra Public Universities Act, 2016 (Mah. Act No. VI of 2017) the Ordinance **6880 & 6881** Regulations **9710 to 9712** and the syllabus of **Bachelor of Design (Industrial Design) (Sem I & II) (CBCS)** has been introduced and the same have been brought into force with effect from the academic year **2023-24**, accordingly.

(The circular is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
30th September, 2024


(Dr. Prasad Karande)
REGISTRAR

A.C/6.11 (N)/1/11/2023.
M.C/7/20/11/2023.

Copy forwarded with Compliments for information to:-

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

Copy forwarded for information and necessary action to :-	
1	The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Dept)(AEM), dr@eligi.mu.ac.in
2	The Deputy Registrar, Result unit, Vidyanagari drresults@exam.mu.ac.in
3	The Deputy Registrar, Marks and Certificate Unit,. Vidyanagari dr.verification@mu.ac.in
4	The Deputy Registrar, Appointment Unit, Vidyanagari dr.appointment@exam.mu.ac.in
5	The Deputy Registrar, CAP Unit, Vidyanagari cap.exam@mu.ac.in
6	The Deputy Registrar, College Affiliations & Development Department (CAD), deputyregistrar.uni@gmail.com
7	The Deputy Registrar, PRO, Fort, (Publication Section), Pro@mu.ac.in
8	The Deputy Registrar, Executive Authorities Section (EA) eau120@fort.mu.ac.in He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
9	The Deputy Registrar, Research Administration & Promotion Cell (RAPC), rapc@mu.ac.in
10	The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA) dy.registrar.tau.fort.mu.ac.in ar.tau@fort.mu.ac.in
11	The Deputy Registrar, College Teachers Approval Unit (CTA), concolsection@gmail.com
12	The Deputy Registrars, Finance & Accounts Section, fort draccounts@fort.mu.ac.in
13	The Deputy Registrar, Election Section, Fort drelection@election.mu.ac.in
14	The Assistant Registrar, Administrative Sub-Campus Thane, thanesubcampus@mu.ac.in
15	The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan, ar.seask@mu.ac.in
16	The Assistant Registrar, Ratnagiri Sub-centre, Ratnagiri, ratnagirisubcentar@gmail.com
17	The Director, Centre for Distance and Online Education (CDOE), Vidyanagari, director@idol.mu.ac.in
18	Director, Innovation, Incubation and Linkages, Dr. Sachin Laddha pinkumanno@gmail.com
19	Director, Department of Lifelong Learning and Extension (DLLE), dlleuniversityofmumbai@gmail.com

Copy for information :-	
1	P.A to Hon'ble Vice-Chancellor, vice-chancellor@mu.ac.in
2	P.A to Pro-Vice-Chancellor pvc@fort.mu.ac.in
3	P.A to Registrar, registrar@fort.mu.ac.in
4	P.A to all Deans of all Faculties
5	P.A to Finance & Account Officers, (F & A.O), camu@accounts.mu.ac.in

To,

1	The Chairman, Board of Deans pvc@fort.mu.ac.in
2	Faculty of Humanities, Dean 1. Prof.Anil Singh Dranilsingh129@gmail.com Associate Dean 2. Dr.Suchitra Naik Naiksuchitra27@gmail.com 3.Prof.Manisha Karne mkarne@economics.mu.ac.in
	Faculty of Commerce & Management, Dean 1. Dr.Kavita Laghate kavitalaghate@jbims.mu.ac.in Associate Dean 2. Dr.Ravikant Balkrishna Sangurde Ravikant.s.@somaiya.edu 3. Prin.Kishori Bhagat kishoribhagat@rediffmail.com

	Faculty of Science & Technology Dean 1. Prof. Shivram Garje ssgarje@chem.mu.ac.in Associate Dean 2. Dr. Madhav R. Rajwade Madhavr64@gmail.com 3. Prin. Deven Shah sir.deven@gmail.com
	Faculty of Inter-Disciplinary Studies, Dean 1. Dr. Anil K. Singh aksingh@trcl.org.in Associate Dean 2. Prin. Chadrashekhkar Ashok Chakradeo cachakradeo@gmail.com
3	Chairman, Board of Studies,
4	The Director, Board of Examinations and Evaluation, dboee@exam.mu.ac.in
5	The Director, Board of Students Development, dsd@mu.ac.in@gmail.com DSW directr@dsw.mu.ac.in
6	The Director, Department of Information & Communication Technology, director.dict@mu.ac.in

University of Mumbai



**Syllabus for
B. Des. (Industrial Design)
Semester – I & II
Choice Based Credit System**

(Introduced from the academic year 2023-24)

University of Mumbai



Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of Course O.6880	B. Des. (Industrial Design)
2	Eligibility O.6881	Passed HSC examination of Maharashtra State Board of Secondary and Higher Secondary Education (any Stream) or its equivalent examination with English as one of the subject and obtained at least 45% marks in aggregate. (Aggregate 40% marks for Backward Class categories, Economically Weaker Section and Persons with Disability candidates belonging to Maharashtra State) and obtained nonzero score in CET conducted by the Competent Authority (MAH -B. Design CET).
3	Standards of Passing	40 %
4	Ordinance / Regulations (if any)	
5	No. of years/Semesters	4 years / 8 semesters
6	Level	Under Graduation
7	Pattern	Semester
8	Status	New
9	To be implemented from Academic Year	With effect From Academic Year: 2023-24


Dr. Deven Shah
Offg. Associate Dean
Faculty of Science and Technology


Dr. Shivram Garje
Offg. Dean
Faculty of Science and Technology

Preamble

Introduction:

The industrial design course prepares students for a professional career in product design, specializing in the development of manufactured objects used by people on a daily basis. By developing products that are innovative, useful, safe, aesthetically appropriate, ecologically sound and socially beneficial, the industrial design profession serves the needs of society, consumers, manufacturers and the environment.

The Industrial Des. Course is a 4-year full-time course in which candidates are admitted after 10+2 level examination or its equivalent as per eligibility guidelines of the AICTE/ DTE/University of Mumbai.

The entire curriculum has been drafted to develop competencies required as an Industrial Designer in a gradual manner that spreads across the four years.

Aims and Objectives:

The aim and objective of the Industrial Design course is to provide students with the intellectual and physical skills to assume leadership positions in the world of industrial design. The course addresses the interaction of people with objects and their environment addressing the cultural, technological, business, ergonomic, ecological and social factors that lead to more useful and meaningful products and services.

Industrial Design course nurtures the creative mind through rigorous inputs in technology, thinking and conceptualizing abilities. While pursuing this degree, students will gain confidence and experience to turn critical thinking and creativity into real-world solutions by designing products with purpose.

O. 6880 Title of Course:-	Bachelor of Design in Industrial Design
O. 6881 Eligibility:-	Passed HSC examination of Maharashtra State Board of Secondary and Higher Secondary Education (any Stream) or its equivalent examination with English as one of the subject and obtained at least 45% marks in aggregate. (Aggregate 40% marks for Backward Class categories, Economically Weaker Section and Persons with Disability candidates belonging to Maharashtra State) and obtained nonzero score in CET conducted by the Competent Authority (MAH –B Design CET).
R. Admission Procedure:-	MAH-B Design-CET Common Entrance Test for Admission to Professional Courses in Bachelor of Design Education through State Common Entrance Test Cell, Mumbai for the academic year will be held at the various examination centers within Maharashtra State. The Competent Authority shall invite Online Applications from Candidates for participating in CET and/ or CAP for seeking admission to the Courses for which State CET or alternative entrance examination is required for the academic year.
R. Term:-	From the academic Year 2022-23
R. Fee:	As per Fees Regulating Authority (FRA)

R. 9710 DURATION:-	4 Years
R. 9711 NUMBER OF STUDENTS:-	30
R. 9712 SCHEME OF EXAMINATION:-	Choice Based Credit System

Learning Outcomes:-
Learner should

1. Demonstrate ability to identify, analyze, and solve industrial design problems.
2. Demonstrate mastery of design tools, techniques, and concepts in industrial design.
3. Demonstrate an understanding of the aesthetics of form development and of the history and current state of design.
4. Demonstrate proficiency in selection and use of relevant technologies in design. Abilities to use available technical and industrial processes to produce a design product, and to design and implement such a process.
5. Demonstrate an understanding of the cultural and societal connections linking industrial design trends and processes as well as a knowledge of business practices and of the market place.
6. Demonstrate proficiency in presenting their own work as well as discussing and constructively critiquing the work of others.

Program Structure for First Year B.Des. (Industrial Design)

SEMESTER I University of Mumbai (With Effect from 2022-2023)

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned		
		Theory	Tutorial	Studio/Practical	Theory	Studio/Practical	Total Credits
BDC101	Fundamentals of Design-I	3	--	--	3	--	3
BDC102	Materials and Processes in Design-I	3	1*	--	4	--	4
BDC103	History of Art, Design and Technology	3	1*	--	4	--	4
BDC104	Communication Skills	3	1*	--	4	--	4
BDC105	Digital Methods-I	2	--	--	2	--	2
BDL101	Fundamentals of Design-I	--	--	2	--	1	1
BDL102	Digital Methods-I	--	--	2	--	1	1
BDL103	Design Sketching	--	--	4	--	2	2
BDL104	Workshop & Model Making	--	--	4	--	2	2
Total		14	3	12	17	06	23

Course Code	Course Name	Examination Scheme							
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)	Term Work	Pract / Oral	Total
		Test 1	Test 2	Avg					
		20	20	20	80	3	50	50	100
BDC101	Fundamentals of Design-I	20	20	20	80	3	--	--	100
BDC102	Materials and Processes in Design-I	20	20	20	80	3	--	--	100
BDC103	History of Art, Design and Technology	20	20	20	80	3	--	--	100
BDC104	Communication Skills	20	20	20	80	3	--	--	100
BDC105	Digital Methods-I	20	20	20	80	3	--	--	100
BDL101	Fundamentals of Design-I	--	--	--	--	--	25	25	50
BDL102	Digital Methods-I	--	--	--	--	--	25	25	50
BDL103	Design Sketching	--	--	--	--	--	50	50	100
BDL104	Workshop & Model Making	--	--	--	--	--	50	--	50
Total				100	400		150	100	750

* shall be conducted batch wise. Each batch will be the either half or one third of the total strength of the class.

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDC101	Fundamentals of Design-I	03	--	03	--	03

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC101	Fundamentals of Design-I	20	20	20	80	3	-	-	100

Course Objectives:

Sr. No.	Course Objectives Fundamentals of Design-I
The course aims:	
1	To Introduce to design provides the framework for understanding design as a new language by sensitizing students to the conceptual, visual and perceptual issues involved in the design process.
2	To understand the basics elements, principles of design and composition.
3	To understand the theories of color and its impact on our lives.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO DESIGN	Definitions and meaning of design, importance of design, examples of design from nature. Fundamental elements of design in 2-D and their definitions; point, line, shape, form, space, texture, value, color and material. Introduction to the principles of design in 2-D and 3D - unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus, etc.; use of grids, creating repetitive patterns.	8

II	CONCEPTS OF GEOMETRY	Introduction to different 3-D forms and primitive forms, shapes and understanding the behavior when combined. Transformation of 2-D to 3-D.	7
III	PRINCIPLES OF COMPOSITION	Principles of composition using grids, symmetrical/asymmetrical, Rule Of Thirds, Center Of Interest, Gestalts Theory of Visual Composition	8
IV	THEORY OF COLORS	Introduction –visible spectrum, colored light, color temperature, color interaction, color blindness. Color wheel – primary, secondary, tertiary colors, color wheel, color schemes color value, intensity, and modification of color hues –tints, shades, neutralization. Color charts – types, making and using. Color harmony, use of color harmony.	8
V	USE OF COLORS	Psychological impact of color – warm, cool and neutral colors, impact of specific hues, meanings of color, color and form, color and light, color and surface qualities, color and distances and scales. Problems with color. Use of colors in various functional contexts. Use of color in special situations – out door/indoor spaces, accessories, art works, products etc.	8

Text Books and References:

- 1) Richard Poulin, The Language of Graphic Design: An Illustrated Handbook for Understanding Fundamental Design
- 2) Amy Graver & Ben Jura, Best Practices for Graphic Designers, Grids and Page Layouts
- 3) Linda Holtzschue, Understanding color, an introduction for designers, Van Nostrand Reinhold, Newyork, 1995.
- 4) Hanks, A.David. Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York, 2003.
- 5) Steven Bradley, Design Fundamentals—Elements, Attributes, & Principles: A Beginner's Guide to Graphic Communication
- 6) Patti Mollica, Special Subjects: Basic Color Theory: An Introduction to Color for Beginning Artists
- 7) Best & Janet, *Colour Design, Second Edition: Theories and Applications*

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Tutorial	Theory	Studio	Total
BDC102	Materials and Processes-I	03	01	04	--	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC102	Materials and Processes -I	20	20	20	80	3	--	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To understand the basic technological and structural aspect of development of Products.
2	To understand the technological aspect of various materials (Plastics, Metals, Ceramics, Glass, Composites and Natural Materials) and their conversion using diverse range of manufacturing processes.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	IMPORTANCE OF MATERIALS AND PROCESSES	Technological and structural aspects of development of Products.	3
II	METAL-MATERIALS AND PROCESSES	Properties and Technological aspect of Metallic Materials and their manufacturing processes. Conversion of these materials using diverse range of manufacturing processes.	13

III	PLASTICS-MATERIALS AND PROCESSES	Properties and Technological aspect of Plastics Materials and their manufacturing processes. Conversion of these materials using diverse range of manufacturing processes.	8
IV	NATURAL MATERIALS AND PROCESSES	Properties and Technological aspect of Natural Materials and their manufacturing processes. Conversion of these materials using diverse range of manufacturing processes.	8
V	CERAMICS, GLASS AND COMPOSITE MATERIALS	Properties and Technological aspect of Ceramics, Glass, Composites Materials and their manufacturing processes. Conversion of these materials using diverse range of manufacturing processes.	8

Text Books:

- 1) Robert Creese, Introduction to Manufacturing Processes and Materials (Manufacturing Engineering and Materials Processing)
- 2) Rajender Singh, Introduction to Basic Manufacturing Processes and Workshop
- 3) Lorraine F. Francis, Materials Processing: A Unified Approach to Processing of Metals, Ceramics and Polymers
- 4) E. Paul DeGarmo, J. T. Black, Ronald A. Kohser, Materials and Processes in Manufacturing, Wiley 2003
- 5) J. P. KAUSHISH, MANUFACTURING PROCESSES, PHI Learning Pvt. Ltd
- 6) Charles A. Harpe, Handbook of Plastic Processes

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be Compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theor y	Tutorial	Theory	Studio	Tota l
BDC103	History of Art, Design and Technology	03	01	04	--	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC103	History of Art, Design and Technology	20	20	20	80	3	-	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To intends to provide an appreciation for art and technology as to how they influence design.
2	To overview of interrelations between various key movements in Art, Technology and design along with their impact.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	New Designers (1676 – 1820)	An Indian Basket, Providence; Division of Labor; Manufacturing, Consumption and Design in England	8
II	Design Reform (1820 – 1901)	Science, Industry and Art; The American System and Mass production; The 1900 Paris Exposition and Art Nouveau; The Art and Craft of the Machine	8

III	Modern Design (1908 – 1950)	Introduction to Modernism in Design; Ornament and Crime; Bauhaus: From workshop to laboratory; Modern art for Modern Design?; The search for an American design aesthetic: Art Deco to Streamlining	8
IV	Design during War/Post-war/Cold war (1943 – 1970)	Utility furniture; British representations of the future; Domesticating the Scientific and technological revolution; All that glitters is not stainless	8
V	Postmodern Design (1963 – 2006)	Ecstasy of Communication; Kitsch/Design; Deconstructivism; Juicy salif; Operating manual for spaceship earth; DIY murder; The Hannover principles	8

Text Books and References:

1. The Story of Art, E. H. Gombrich, 16th Edition, Phaidon Press, ISBN 9780714832470
2. Design: A Very Short Introduction, John Heskett, Oxford University Press, 2002, ISBN 0–19– 285446–1
3. The Pencil: A History of Design and Circumstance, Henry Petroski, Alfred Knopf Publishing, 2010, ISBN 978-0-307-77243-4.
4. The Bauhaus Ideal: Then and Now, An Illustrated Guide to Modern Design, William Smock, Academy Chicago Publishers, 2004
5. Design History: A student's handbook, Ed. Hazel Conway, Routledge, 1987, ISBN 0-415-08473-3
6. Engineers: A history of engineering and structural design, Matthew Wells, Routledge 2010 ISBN 13: 978–0-415–32525–7
7. Global Design History, Edited by Glenn Adamson, Giorgio Riello and Sarah Teasley, Routledge 2011, ISBN 13: 978–0–415–57285–9
8. The Design History Reader, Edited by Grace Lees-Maffei and Rebecca Houze, Berg Publishing, 2010, ISBN 978 1 84788 388 9
9. Designs of the Times, Using Key Movements and Styles for Contemporary Design, Lakshmi Bhaskaran, 2006 Impact B. Jain Publishers, ISBN 81-8056-805-9
10. Sir Banister Fletcher's a History of Architecture, Sir Banister Fletcher, Dan Cruickshank, 20th Edition, Architectural Press ISBN 9780750622677
11. "Handmade in India_ Crafts of India", Edited by Aditi Ranjan and M P Ranjan, ISBN 978-81-88204- 57-1
12. Dana Arnold, *Art History: Contemporary Perspectives on Method*

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q. 2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Tutorial	Theory	Studio	Total
BDC104	Communication Skills	03	01	04	--	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC104	Communication Skills	20	20	20	80	3	-	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To introduce students to the basic concepts of Communication Skills and mechanisms involved in developing vocabulary
2	To explore the four basic skills LSRW and develop a practical approach to respond effectively to carry out Communication.
3	To Understand the essence of creative writing and formal writing with appropriate formats
4	To Exploring the aspects of Speaking Skills through listening and speaking drills
5	To make students understand the importance of Soft Skills

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	Introduction to communication skills:	Introduction to communication skills, What are communication skills?, 7 C's of communication, Ice breakers, conversation starters, self-introduction, importance of effective listening and appropriate usage and enhancement of vocabulary	5

II	Verbal and non-verbal communication	stress and tone of voice, body language, eye contact, posture, power dressing, greeting etiquette, Manners and etiquette	9
III	Written communication	creation of points, brainstorming, mind-mapping, official letter writing, email writing, email etiquettes, resume writing, report writing, content writing	8
IV	Presentation skills	Public speaking skills enhancement, PPTs, group discussion, debates, extempore, enhancing thought processes, creating flash cards	8
V	Soft skills	Self-assessment, decision-making, time management, team building, stress and anger management, emotional intelligence, positive thinking	10

Text Books and References:

1. Active Listening: How to Turn Down Your Volume to Turn Up Your Communication Skills, by Emilia Hardman, 2012
2. Bhaskar W.W.S. and Prabhu, N.S. "English Through Reading", Vol.-I & II,
3. Developing Effective Communication and Social Skills, by Greg S. Baker, 2011
4. D'Souza Eunice and Shahani, G. "Communication Skills in English"
5. Fiske, John "Introduction to Communication Studies"
6. How to talk to anyone by Leil Lowndes
7. Personality Development through Life Enlightenment Skills by Kalyani Kale
8. Sharma R.C. and Mohan, K., "Business Correspondence and Report Writing",
9. Skill with People by Les Giblin
10. Barbara and Allan Pease, *The Definitive Book of Body Language*
11. Marco Tapia, *Interpersonal Communication Skills*
12. Urmila Rai, *English Language Communication Skills*

Assessment:

Internal Assessment (IA) for 20 marks:

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Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered.

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDC105	Digital Methods-I	02	--	02	--	02

Course Objectives:

Sr. No.	Course Objectives
The course aims to expose students to:	
1	Digital photography and videography
2	Framing/composing pictures
3	Narrative through image

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO PHOTOGRAPHY AND VIDEOGRAPHY	Brief history of photography and videography, the moving image, cameras and lenses for these, aspects of media storage	3
II	BASICS OF IMAGE CAPTURING AND VISUAL EFFECTS	Basics of image capturing and visual effects. Subject, texture, light (exposure and metering), form, movement, space, depth of field etc.	9
III	COMPOSITION IN PHOTOGRAPHY	Composition in photography. Balance in an image, camera controls for these, and photography exercises; re-touching images	9
IV	COMPOSITION IN VIDEOGRAPHY	Composition in videography. creating and editing videos digitally combined with audio effects, creating a digital film for a video CV of oneself and of a design	9
V	GROUP PROJECT	Undertaking group project activities	10

Text Books and References:

1. "The Beginner's Photography Guide", 2nd Edition, DK, 2016.
2. London, B., Upton, J., & Stone J. (2010). Photography (10th ed.). Upper Saddle River, NY: Prentice Hall.
3. Digital Filmmaking for Beginners A Practical Guide to Video Production Apr 23, 2012, Michael K. Hughes, Publisher: McGraw-Hill Education TAB; 1 edition (April 23, 2012), ISBN-13: 978-0071791366
4. Videomaker. (2007). The Videomaker Guide to Video Production (4th ed.). Burlington, MA: Focal Press.
5. The Art of Photography
6. Ciaglia, Joseph, *Absolute Beginner's Guide to Digital Photography*
7. *DSLR Photography for Beginners*
8. Mark Sawicki, *Filming the Fantastic: A Guide to Visual Effects Cinematography*
9. Stephen M. Hockman, *Mastering Composition in Digital Photography*
10. Sean Cubitt, *Videography: Video Media as Art and Culture*

Assessment:

Internal Assessment (IA) for 20 marks:

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Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDL101	Fundamentals of Design-I	--	02	--	01	01

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL101	Fundamentals of Design-I	--	--	--	--	--	25	25	50

Course Objectives:

Sr. No.	Course Objectives
The course aims to:	
1	Introduce to design provides the framework for understanding design as a new language by sensitizing students to the conceptual, visual and perceptual issues involved in the design process.
2	Understand the basics elements, principles of design and composition.
3	Understand the theories of color and its impact on our lives.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO DESIGN	Definitions and meaning of design, importance of design, examples of design from nature. Fundamental elements of design in 2-D and their definitions; point, line, shape, form, space, texture, value, color and material. Introduction to the principles of design in 2-D and 3D - unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus, etc.; use of grids, creating repetitive patterns.	8

II	CONCEPTS OF GEOMETRY	Introduction to different 3-D forms and primitive forms, shapes and understanding the behavior when combined. Transformation of 2-D to 3-D.	7
III	PRINCIPLES OF COMPOSITION	Principles of composition using grids, symmetrical/asymmetrical, Rule Of Thirds, Center Of Interest, Gestalts Theory of Visual Composition	8
IV	THEORY OF COLORS	Introduction –visible spectrum, colored light, color temperature, color interaction, color blindness. Color wheel – primary, secondary, tertiary colors, color wheel, color schemes color value, intensity, and modification of color hues –tints, shades, neutralization. Color charts – types, making and using. Color harmony, use of color harmony.	8
V	USE OF COLORS	Psychological impact of color – warm, cool and neutral colors, impact of specific hues, meanings of color, color and form, color and light, color and surface qualities, color and distances and scales. Problems with color. Use of colors in various functional contexts. Use of color in special situations – out door/indoor spaces, accessories, art works, products etc.	8

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments, / Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work-25

Laboratory work- 20 Marks

Attendance- 05 Marks

Text Books and References:

- 1) Richard Poulin, The Language of Graphic Design: An Illustrated Handbook for Understanding Fundamental Design
- 2) Amy Graver & Ben Jura, Best Practices for Graphic Designers, Grids and Page Layouts
- 3) Linda Holtzschue, Understanding color, an introduction for designers, Van Nostrand Reinhold, Newyork, 1995.
- 4) Hanks, A.David. Decorative Designs of Frank Lloyd Wright, Dover Publications, Inc. New York, 2003.
- 5) Steven Bradley, Design Fundamentals—Elements, Attributes, & Principles: A Beginner's Guide to Graphic Communication
- 6) Patti Mollica, Special Subjects: Basic Color Theory: An Introduction to Color for Beginning Artists
- 7) Best & Janet, *Colour Design, Second Edition: Theories and Applications*

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDL102	Digital Methods -I	--	02	--	01	01

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL102	Digital Methods -I	--	---	--	--	----	25	25	50

DETAILED SYLLABUS

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO PHOTOGRAPHY AND VIDEOGRAPHY	Brief history of photography and videography, the moving image, cameras and lenses for these, aspects of media storage	3
II	BASICS OF IMAGE CAPTURING AND VISUAL EFFECTS	Basics of image capturing and visual effects. Subject, texture, light (exposure and metering), form, movement, space, depth of field etc.	9
III	COMPOSITION IN PHOTOGRAPHY	Composition in photography. Balance in an image, camera controls for these, and photography exercises; re-touching images	9
IV	COMPOSITION IN VIDEOGRAPHY	Composition in videography. creating and editing videos digitally combined with audio effects, creating a digital film for a video CV of oneself and of a design	9
V	GROUP PROJECT	Undertaking group project activities	10

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments / Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work

Laboratory work 20 Marks

Attendance 05 Marks

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task: **15 marks**

Oral: **10 marks**

3. Evaluation of practical/oral examination to be done based on the performance of design task

4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

1. "The Beginner's Photography Guide", 2nd Edition, DK, 2016.
2. London, B., Upton, J., & Stone J. (2010). Photography (10th ed.). Upper Saddle River, NY: Prentice Hall.
3. Digital Filmmaking for Beginners A Practical Guide to Video Production Apr 23, 2012, Michael K. Hughes, Publisher: McGraw-Hill Education TAB; 1 edition (April 23, 2012), ISBN-13: 978-0071791366
4. Videomaker. (2007). The Videomaker Guide to Video Production (4th ed.). Burlington, MA: Focal Press.
5. The Art of Photography
6. Ciaglia, Joseph, *Absolute Beginner's Guide to Digital Photography*
7. *DSLR Photography for Beginners*
8. Mark Sawicki, *Filming the Fantastic: A Guide to Visual Effects Cinematography*
9. Stephen M. Hockman, *Mastering Composition in Digital Photography*
10. Sean Cubitt, *Videography: Video Media as Art and Culture*

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDL103	Design Sketching	--	04	--	02	02

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL103	Design Sketching	--	--	--	--	---	50	50	100

Course Objectives:

Sr. No.	Course Objectives
The course overviews :	
1	Fundamental aspects of freehand sketching
2	Drawing geometry for design
3	Improving hand-eye and mind-eye co-ordination for sketching

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	Sketching of basic elements	Starting to sketch; right pencil grip and representation using graphite pencils of lines, circles and ellipses	8
II	Objects & Perspective	Drawing surfaces, volumes and radii; Object drawing fundamentals; Principles of drawing in perspective	8

III	Isometric Drawings	Isometric drawings and guides for making these effectively	8
IV	Representation of features in perspective	Guides to representing design features/elements in perspective	8
V	Mind-eye coordination in sketching	Improving mind-eye co-ordination for sketching; types of design sketches	8

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments, (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work-50

Laboratory work- 40 Marks

Attendance- 10 Marks

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task: **30 marks**

Oral: **20 marks**

3. Evaluation of practical/oral examination to be done based on the performance of design task

4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

1. Sketching: The Basics, Koos Eissen, Thames and Hudson 2013, ISBN-13: 978-9063692537
2. Basic Sketching Techniques for the Industrial Designer, Version 1, Thomsa Valcke.
3. The Exceptionally Simple Theory of Sketching: Why do Professional Sketches Look Beautiful?, George Hlavacs, Thames and Hudson, 2014, ISBN-13: 978-9063693343
4. Drawing Ideas: A Hand-Drawn Approach for Better Design, Mark Baskinger, William Bardel, Watson Gupill, 2013, ISBN-13: 978-0385344623
5. Design Drawing Paperback – Francis D.K. Ching, Publisher: Wiley India Pvt Ltd; Second edition (23 April 2012), ISBN-13: 978-8126535651
6. Experiences in Visual Thinking, 2nd Edition, March 12, 1980, Robert H. McKim
7. Anatomy & Drawing - Victor Perard, Grace Prakashan; New Enlarged Edition edition (1 December 2006), ISBN-13: 978-8190089005
8. James Richards, *Freehand Drawing and Discovery: Urban Sketching and Concept Drawing for Designers*
9. Jorge Paricio, *Perspective sketching: Freehand and Digital Drawing Techniques for Artists & Designers*

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theor y	Studio	Theory	Studio	Total
BDL104	Workshop and Model Making	---	04	---	02	02

Course Objectives:

Sr. No.	Course Objectives
The course aims to :	
1	Understand the properties of soft materials
2	Acquire ability to manipulate soft and pliable material to create new forms

Course Code	Course Name	Examination Scheme							
		Theor y					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL103	Design Sketching	--	---	---	---	---	50	50	100

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO MODEL MAKING	Need; role of scale models in design: general practices: Essentials of model making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques. Introduction to the Mount Board/Paper/Boards for model making – types, properties etc. Hand building techniques on different planes - making rigid forms like, cubic, spherical, pyramidal shaped forms, depiction of steps, free forms,	5

		sculptures, etc.	
II	MATERIALS AND TECHNIQUES (CLAY)	Ceramics – clay/ plaster of Paris: Introduction to model making, Need; role of scale models in design: general practices - The potter's wheel – kneading the clay, function of hands in throwing. Learning basic techniques in making different objects like bowl, plate, cylinder, vase, etc. Essentials of model making: understanding of various tools and machines employed, best practices involved in operating the tools and the techniques. Introduction to the Ceramic materials used for model making – clay, types and mixtures, properties etc. Hand building techniques- coiling, hand building with clay strips- making a small sculpture in Relief work – addition - making a mural, scooping – tile work.	7
III	MATERIALS AND TECHNIQUES (WOOD)	Wood: Working with wood and wood derivatives to understand material parameters. Wooden joinery and its strength, Wood polishes and other finishes – colour and surface quality. Making of elements of various scales in the built form, such as, interior space making elements, furniture forms, various products, Art & Artifacts by using wood. Understanding the material and tools by making objects which allow students to explore the forms, surfaces, textures and patterns. Explore different joinery, support conditions, and woven surfaces.	7
IV	MATERIALS AND TECHNIQUES (METAL)	Metal: Types of metals, properties of metals, definitions of terms with reference to properties and uses of metals, various methods of working with metals, fixing and joinery in metals, finishing and treatment of metals., finishes on metals. Standard specifications. Metals in built form activity – horizontal, vertical and inclined surfaces – in interior environment elements- products and furniture forms - doors, windows, grilles, railing, stair etc. Metals and other materials – form and joinery.	7
V	MATERIALS AND TECHNIQUES (TEXTILES)	Textiles – Weaving & printing: Introduction to fibers and yarns, table loom and floor loom, preparing warp, setting up loom for weaving. Basic weaves and their variations. Variation weaves and design quality, weaves as light controlling device, weaves and its quality for upholstery, curtains and floor coverings, Rugs and durries – motifs design, patterns and color variations. Development of textile design in different cultures from primitive art to contemporary designs. Criteria of design of the elements and principles of textile design. Analysis of a motif, developing repeat as a basic unit of design in textile printing. Printing – developing block, understanding the material used, colors, types and their mixing process, various color printing. Screen printing – design evolution for wall hangings, preparing screen and understanding the technique, printing on paper and printing on fabric.	7
VI	MATERIALS AND TECHNIQUES (PLASTICS)	Plastics: Types of plastics, properties of plastics, definitions of terms with reference to properties and uses of plastics, various methods of working with plastics, Standard specifications. Applications of plastics and their purposes. Making objects and products from plastic materials.	7

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments/ Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work-50

Laboratory work- 40 Marks

Attendance- 10 Marks

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task : 15 marks

Oral : 10 marks

3. Evaluation of practical/oral examination to be done based on the performance of design task

4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

- 1) Raymond Francis Yates, Model Making, Including Workshop Practice, Design and Construction of Models, Fb&c Limited, 2017.
- 2) Norman G. Taylor, Model Building and Design - with 94 Illustrations, Read Books, 2013.
- 3) Carol Stangler, The crafts and art of Bamboo, Rev. updated edition, Lark books, 2009.
- 4) Lonnie Bird, Jeff Jewitt, Thomas lie- Nielsen, Taunton's Complete Illustrated Guide to Woodworking, Taunton, 2005.
- 5) Peter Korn, Wood working Basics : Mastering the essentials of craftsmanship, Taunton , 2003
- 6) Liz Gibson, Weaving Made Easy: 17 Projects Using a Simple Loom (Paperback), Interweave press, 2008
- 7) Deoborah Chandler, Learning to weave, Revised edition, Interweave press, 2009. textiles, Crowood press, 2005
- 8) Fabrics: A guide for architects and Interior Designers, Marypaul Yates, Norton publishers, 2002.
- 9) Materials for Interior Environments, Corky Bingelli, John wiley and sons, 2007
- 10) Metal Shaping Processes - Casting and Molding; Particulate Processing; Deformation Processes; and Metal
- 11) Model Making: Including Workshop Practice, Design and Construction of Models, a Practical Treatise for the Amateur and Professional Mechanic By Raymond Francis Yates

Program Structure for First Year B.Des. (Industrial Design)

SEMESTER II University of Mumbai (With Effect from 2022-2023)

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Tutorial	Studio	Theory	Studio	Total Credits		
BDC201	Design Methods and Tools	3	--	—	3	—	3		
BDC202	Introduction to Ergonomics	3	1*	--	4	--	4		
BDC203	Fundamentals of Design -II	3	1*	--	4	--	4		
BDC204	Materials and Processes-II	3	1*	--	4	--	4		
BDC205	Digital Methods-II	2	--	—	2	—	2		
BDL201	Design Methods and Tools	--	--	2	--	1	1		
BDL202	Drawing and Rendering			2		1	1		
BDL203	Design Studio – Problem Solving Process	--	--	4	--	2	2		
BDL204	Digital Methods-II			2		1	1		
Total		14	3	10	12	10	22		
Course Code	Course Name	Examination Scheme							
		Internal Assessment			End Sem Exam	Exam Duration (Hrs)	Term Work	Pract / Oral	Total
		Test 1	Test 2	Avg					
		20	20	20					
BDC201	Design Methods and Tools	20	20	20	80	3	--	--	100
BDC202	Introduction to Ergonomics	20	20	20	80	3	--	--	100
BDC203	Fundamentals of Design -II	20	20	20	80	3	--	--	100
BDC204	Materials and Processes-II	20	20	20	80	3	--	--	100
BDC205	Digital Methods-II	20	20	20	80	3	--	--	100
BDL201	Design Methods and Tools	--	--	--	--	--	25	25	50
BDL202	Drawing and Rendering	--	--	--	--	--	25	25	50
BDL203	Design Studio – Problem Solving Process	--	--	--	--	--	50	50	100
BDL204	Digital Methods-II	--	--	--	--	--	25	25	50
Total				100	400		125	125	750

* shall be conducted batch wise. Each batch will be the either half or one third of the total strength of the class.

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDC201	Design Methods and Tools	03	--	03	---	03

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC201	Design Methods and Tools	20	20	20	80	3	--	- - -	100

Course Objectives:

Sr. No.	Course Objectives
The course aims to :	
1	Develop problem solving skill
2	Explore the various techniques of out of box thinking and selecting appropriate one based on the circumstance and situation
3	Use various principals and methods of design for problem solving
4	Build decision making skills to select feasible/good ideas

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	CREATIVITY	Definitions and meaning of creativity; types of creativity, role of creativity in problem solving, how to learn and build creativity skills, relevance and importance of creativity in the todays world.	3

II	CREATIVE THINKING TOOLS	Thinking tool no. 1: Kick Cards, 2: The Inverse, 3: Double Six Good Bad Interesting: Get creative thinking with the G.B.I. exercise – Dr. Edward de Bono. Brainstorming	9
III	PRINCIPLES OF CREATIVITY	Creative Problems: Defining creative problems and solutions. Diffusion: Spreading ideas through social networks. Divergence and convergence: Staying open and staying focused. Exploration: Going where no one has gone before. Forced association: Banging things together to create new things. Ground Rules: Shared rules that enable safe creativity. Jumping: Jumping to new idea domains. Practice: Build your 'creative muscle' with regular practice. Questioning: Asking things to get the mind going.	9
IV	TOOLS FOR DEFINING THE PROBLEM	Breakdown: Decomposing to find the area of optimal focus. CATWOE: A checklist for thinking about problems and solutions. Challenge: Challenge any part of the problem. Chunking: Take a higher or more detailed view. Context Map: Mapping the overall problem domain. A Day In The Life Of...: Seeing things as they are experienced. Is – Is not: To scope out boundary of problems. How to: Frame statements as 'How to' to trigger focused thinking. The Kipling method (5W1H): Ask simple questions for great answers. Moment of Truth (MoT) Analysis: Finding vulnerable customer moments. Positives, Negatives: Look at both problems and benefits. Problem Statement: Getting a clear statement of what you are trying to achieve. Purposing: Finding the real purpose of what you are doing. Reversal: Looking at the problem backwards. Storyboarding: Creating a visual story to explore or explain. Value Analysis: Finding a high-value focus for innovation. Visioning: Creating a motivating view of the future.	5
V	TOOLS FOR CREATING IDEAS	Absence Thinking: Think about what is not there. Art streaming: Keep creating until you get through the blocks. Assumption Busting: Surfacing and challenging unconscious assumptions. Attribute Listing: Listing attributes of objects and then challenging them. Brainstorming: The classic creative method for groups. Brain drawing: Good for reticent groups. Brain mapping: Combining brain writing and mind-mapping. Brain writing: Group doodling for non-verbal stimulation. Breakdown: Careful decomposition to explore the whole system. Delphi Method: Explore ideas or gain consensus with remote group. Doodling: Let your subconscious do the drawing. Essence: Looking elsewhere whilst retaining essential qualities.	9

		Forced Conflict: Using conflict to stimulate the subconscious. Guided Imagery: Letting your subconscious give you a message. How-How Diagram: Break down problem by asking 'how'. How to: Frame statements as 'How to' to trigger focused thinking. Incubation: Letting the subconscious do the work. The Kipling method (5W1H): Ask simple questions for great answers. Lateral thinking: Thinking sideways to create new ideas. Lotus Blossom: Unfold the flower of extended ideas. Chunking: Go up and then down elsewhere. Mind-mapping: Hierarchical breakdown and exploration. Modeling: For the artist in everyone. Morphological Analysis: Forcing combinations of attribute values. Nominal Group Technique: Getting ideas with minimal personal interaction. Random Words: Using a random word as a stimulus. Right braining: Combine incomplete doodles around the problem. Role-play: Become other people. Let them solve the problem. Remembrance: Remembering solutions not yet discovered. Reversal: Looking at the problem backwards. Reverse Brainstorming: Seek first to prevent your problem from happening. Rubber-ducking: Get someone else to listen to your talk. SCAMPER: Using action verbs as stimuli. Six Thinking Hats: Think comfortably in different ways about the problem. Storyboarding: Creating a visual story to explore or explain. Take a break: When creativity is fading. Talk streaming: Just talk and talk and talk until you unblock. TRIZ Contradiction Analysis: Use methods already used in many patents. Unfolding: Gradually unfolding the real problem from the outside. Value Engineering: Deep analysis to understand and innovate in areas of key value. Visioning: Creating a motivating view of the future. Wishing: State ideas as wishes to expand thinking. Write streaming: Write and write and write until you unblock.	
VI	TOOLS FOR SELECTING IDEAS	Concept Screening: Comparing options against a baseline benchmark. Delphi Method: Explore ideas or gain consensus with remote group. Force-field Analysis: Exploring forces for and against an idea. The Hundred Dollar Test: How will you spend \$100 on your ideas? The Kipling method (5W1H): Ask simple questions for great answers. Negative Selection: Sort out the 'definitely nots' first. NUF Test: Check idea is New, Useful and Feasible. Pause: Reflect for a minute before deciding. PINC Filter: Evaluate pros and cons of ideas.	4

		Six Thinking Hats: Look at ideas from different viewpoints. Swap sort: Sorting a short list by priority swapping. Voting: Democratic casting of votes for the best idea.	
VII	TOOLS FOR SELECTING IDEAS	Adoption Checklist: A checklist of what leads to adoption. CATWOE: A checklist for thinking about problems and solutions. Changing Minds: The ultimate persuasion website. A Day In The Life Of...: Imagining how your solution will be used. Diffusion Lifecycle: Head, Heart and Hands: Get all three systems of motivation engaged. How-How Diagram: Build plan by repeatedly asking 'how'. Mind-mapping: Use a mind-map to build a plan. Positives, Negatives: Look at both problems resolved and benefits gained. Purposing: Finding the real purpose of how the idea will be used. Remembrance: Remembering solutions not yet discovered. Reverse Planning: Working backwards from a perfect future. Role-play: Become other people you must persuade. Let them tell you what to say. Rubber-ducking: Six Thinking Hats: Storyboarding:	4

Text Books and References:

- 1) Thomas Richards, *Problem Solving: Best Strategies to Decision Making, Critical Thinking and Positive Thinking*
- 2) Arthur B. Vangundy, *101 Activities For Teaching Creativity And Problem Solving*
- 3) Cynthia Harris, *Creative and Critical Thinking*
- 4) Tom Kelley & Jonathan Littman & Tom Peters, *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*
- 5) Michael Michalko, *Thinkertoys: A Handbook of Creative-Thinking Techniques*
- 6) Michael Michalko, *Cracking Creativity: The Secrets of Creative Genius*
- 7) Edward De Bono, *Creativity Workout*
- 8) Rod Judkins, *The Art of creative thinking*, Sceptre Pub, 2015 2012

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Tutorial	Theory	Tutorial	Total
BDC202	Introduction to Ergonomics	03	01	03	01	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC202	Introduction to Ergonomics	20	20	20	80	3	--	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To develop understanding relationship between ergonomics of work and human beings; analytical background for work that is designed around human capabilities and limitations
2	To understand and integrate scientific (Objective) methodology to design products, processes and services more efficient, more comfortable with improved usability. Understand aspects of human safety and comfort for a product design.
3	To develop understanding of physical and cognitive aspects of comfort, efficiency, utility and safety in human machine interfaces, processes and services.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION AND IMPORTANCE OF ERGONOMICS	History and focus of ergonomics, Ergonomics and its areas of application in the work system, humanizing work, modern ergonomics; Relationship between ergonomics of work and human beings.	5
II	DESIGN AND ERGONOMICS	Human capabilities and limitations, Anthropometrical, Physiological, Psycho-social considerations in Ergonomics ; Integration of scientific (Objective) methodology to design products, processes and services more efficient, more comfortable with improved usability.	9

III	APPLICATION AND USAGE OF ERGONOMICS	Basic body mechanics, Postural stability and postural adaptation, Risk factors for musculoskeletal disorders in the workplace, behavioral aspects of posture ; Physical and cognitive aspects of comfort, efficiency, utility and safety in human machine interfaces, processes and services.	9
IV	PRINCIPALS OF APPLIED ANTHROPOMETRY	Designing for a population of users, Sources of human variability, Anthropometry and its uses in ergonomics, Principles of applied anthropometry for ergonomics in design	9
V	DESIGN FOR EVERYONE	Design for Seating and Standing work. Principles for the design of visual displays; Auditory displays, Design of controls; Combining displays and controls; Virtual environment.	8

Text Books and References:

1. "Introduction to Ergonomics", R.S Bridger, , McGraw-Hill Inc., 1995
2. "Human Factors in engineering and Design", M. S. Sanders and Ernest J. McCormick:, Sixth Edi., McGraw-Hill International Editions, 1987
3. "Indian Anthropometric Dimensions for Ergonomic Design Practice", D. Chakrabarti, National Institute of Design, Ahmedabad, 1997
4. "Handbook of Human Factors and Ergonomics", G. Salvendy Ed., , John Wiley and Sons, 1997

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Tutorial	Theory	Tutorial	Total
BDC203	Fundamentals of Design -II	03	01	03	01	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC203	Fundamentals of Design -II	20	20	20	80	3	--	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To develop design aptitude through understanding of the elements and principles of design for visual composition and developing a design language

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	Principles of Design – I	Principles of Design - symmetry, scale, mass, proportion, contrast on the basis of design elements and Gestalts, figure ground relationships.	8
II	Principles of Design –II	Principles of Design - pattern, movement, rhythm, harmony, variety and unity on the basis design elements and Gestalts, figure ground relationships.	9
III	Design Language	Composition and Case studies of analyzing consumer products (2D & 3D) for their design language.	7
IV	Design and User Experience	Design principles that are particular to user experience	9

V	Design elements and their composition	Integrative studio exercises composing using elements and principles of design	8
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Text Books and References:

1. Evans, P., and Thomas, M., Exploring the Elements of Design, Thomson, USA
2. Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
3. Lidwell, William; Holden, Kritina; Butler, Jill; Universal Principles of Design, Rockport Publishers, 2003
4. Kepes, Gyorgy; Language of Vision, Dover Publications, 1995
5. Elam, Kimberly; Geometry of Design: Studies in Proportion and Composition, Princeton Architectural Press, 2001
6. Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997
7. Young, F.M., Visual Studies, Prentice Hall, USA
7. Lawlor, Robert; Sacred Geometry: Philosophy and Practice (Art and Imagination), Publisher: Thames & Hudson, 1989
8. Hall, Edward Twitchell; The Hidden Dimension, Publisher: Anchor; Reissue edition, 1990
9. Bachelard, Gaston; Jolas, Maria (Translator); The Poetics of Space, Publisher: Beacon Press; Reprint edition, 1994
10. Livio, Mario; The Golden Ratio: The Story of PHI, the World's Most Astonishing Number, Publisher: Broadway, 2003
11. Jute, Andre; Grids: the structure of graphic design. Crans-Pres-Celigny : Rotovision, 1996.

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)
- A total of **four questions** need to be answered

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Tutorial	Theory	Studio	Total
BDC204	Materials and Processes –II	03	01	03	01	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC204	Materials and Processes –II	20	20	20	80	3	-	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To gain knowledge and skills related to 3D printing technologies
2	To learn the selection of material, equipment and development of a product for Industry 4.0 environment.
3	To understand the various software tools, process and techniques for digital manufacturing
4	To apply these techniques into various applications

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	3D Printing (Additive Manufacturing)	Introduction, Process, Classifications, Advantages, Additive v/s Conventional Manufacturing processes, Applications.	7
II	CAD for Additive Manufacturing	CAD Data formats, Data translation, Data loss, STL format.	5

III	Additive Manufacturing Techniques	Stereo- Lithography, LOM, FDM, SLS, SLM, Binder Jet technology. Process, Process parameter, Process Selection for various applications. Additive Manufacturing Application Domains: Aerospace, Electronics, Health Care, Defence, Automotive, Construction, Food Processing, Machine Tools	10
IV	Materials	Polymers, Metals, Non-Metals, Ceramics Process, Process parameter, Process Selection for various applications. Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties. Support Materials	7
V	Additive Manufacturing Equipment	Process Equipment- Design and process parameters, Governing Bonding Mechanism, Common faults and troubleshooting, Process Design	5
VI	Post Processing requirement, technique and quality	Support Removal, Sanding, Acetone treatment, polishing, Inspection and testing, Defects and their causes	5

Text Books References:

- 1) Ian Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
- 2) Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, 2011.
- 3) Khanna Editorial, "3D Printing and Design", Khanna Publishing House, Delhi.
- 4) CK Chua, Kah Fai Leong, "3D Printing and Rapid Prototyping- Principles and Applications", World Scientific, 2017.
- 5) J.D. Majumdar and I. Manna, "Laser-Assisted Fabrication of Materials", Springer Series in Material Science, 2013.
- 6) L. Lu, J. Fuh and Y.S. Wong, "Laser-Induced Materials and Processes for Rapid Prototyping", Kulwer Academic Press, 2001.
- 7) Zhiqiang Fan And Frank Liou, "Numerical Modelling of the Additive Manufacturing (AM) Processes of Titanium Alloy", InTech, 2012

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)

A total of **four questions** need to be answered.

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDC205	Digital Methods -II	02	--	02	--	02

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDC205	Digital Methods -II	20	20	20	80	3	-	-	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	To introduce students to tools for creating and manipulating images digitally
2	To compose forms out of basic forms and Boolean operations, digital solid modeling features for generating parts/components, modeling aspects of assembly of parts and components

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO 2D SOFTWARE TOOLS	Introduction to and getting started with Photoshop and Illustrator	07
II	USE OF 2D SOFTWARE TOOLS TO REALISE DESIGN INTENT	Working with Images, selection tools resizing and cropping them in both tools, Using layers and operations; painting in both tools, Color and adjustment tools; Working with Pen tool and paths, Introduction to special effects, quick-mask mode. Exporting work	07

III	INTRODUCTION TO BASIC 3D OBJECT CREATION	History and evolution of Digital solid sculpting. Introduction to basic object creation; point, line, plane, shape, surface form and interpreting them from a design perspective	08
IV	USE OF 3D SOFTWARE TOOLS TO REALISE DESIGN INTENT	Modeling of basic forms, composing forms with single and multiple type of these based on the visual feedback from the renderers or off screen rendered views. Boolean operations and composing forms using one or a combination of operations and interpreting them from the perspective of form composition, transitions, intersections etc. Feature operations on forms composed and their design significance Parametric modeling of parts/components and their assembly	09

Assessment:

Internal Assessment (IA) for 20 marks:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of syllabus content must be covered in First IA Test and remaining 40% to 50% of syllabus content must be covered in Second IA Test

Question paper format

- Question Paper will comprise of a total of **six questions each carrying 20 marks.**
- Q.1 will be compulsory and should cover maximum contents of the syllabus
- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)

A total of **four questions** need to be answered.

Text Books and References:

1. "Adobe Creative Cloud All-in-One For Dummies", Jennifer Smith, Christopher Smith, John Wiley & Sons 2017
2. Go Design Now! Photoshop for Designers Paperback, Rick McCawley, Lulu.com, 2014 ISBN-13: 978-1304934529
3. Workshop for Designers: Adobe Photoshop and Rendering Paperback, Arpad Ronaszegi, Createspace Independent Pub; 2 edition (5 December 2017), ISBN-13: 978-1981463657
4. Adobe Illustrator CC Classroom in a Book (2018 release), Brian Wood, Adobe Publishing, ISBN-13: 978-0134852492
5. Adobe Xd CC Classroom in a Book (Feb 2018), Brian Wood, Adobe Publishing ISBN-13: 978- 0134686592
6. "CAD/CAM theory and practice", Zeid, I. McGraw-Hill Higher Education, 1991

7. "CAD CAM: From principles to practice", McMahon, C., & Browne, J. J. Addison-Wesley Longman Publishing Co., Inc., 1993
8. Solidworks and Autodesk Inventor/Fusion online help manuals

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDL201	Design Methods and Tools	--	02	--	02	01

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL201	Design Methods and Tools	--	--	--	---	--	25	25	50

Course Objectives

Sr. No.	Course Objectives
The course aims to:	
1	Develop problem solving skill
2	Explore the various techniques of out of box thinking and selecting appropriate one based on the circumstance and situation
3	Use various principals and methods of design for problem solving
4	Build decision making skills to select feasible/good ideas

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	CREATIVITY	Definitions and meaning of creativity; types of creativity, role of creativity in problem solving, how to learn and build creativity skills, relevance and importance of creativity in the todays world.	3
II	CREATIVE THINKING TOOLS	Thinking tool no. 1: Kick Cards, 2: The Inverse, 3: Double Six Good Bad Interesting: Get creative thinking with the G.B.I. exercise – Dr. Edward de Bono. Brainstorming	9

III	PRINCIPLES OF CREATIVITY	Creative Problems: Defining creative problems and solutions. Diffusion: Spreading ideas through social networks. Divergence and convergence: Staying open and staying focused. Exploration: Going where no one has gone before. Forced association: Banging things together to create new things. Ground Rules: Shared rules that enable safe creativity. Jumping: Jumping to new idea domains. Practice: Build your 'creative muscle' with regular practice. Questioning: Asking things to get the mind going.	9
IV	TOOLS FOR DEFINING THE PROBLEM	Breakdown: Decomposing to find the area of optimal focus. CATWOE: A checklist for thinking about problems and solutions. Challenge: Challenge any part of the problem. Chunking: Take a higher or more detailed view. Context Map: Mapping the overall problem domain. A Day In The Life Of...: Seeing things as they are experienced. Is – Is not: To scope out boundary of problems. How to: Frame statements as 'How to' to trigger focused thinking. The Kipling method (5W1H): Ask simple questions for great answers. Moment of Truth (MoT) Analysis: Finding vulnerable customer moments. Positives, Negatives: Look at both problems and benefits. Problem Statement: Getting a clear statement of what you are trying to achieve. Purposing: Finding the real purpose of what you are doing. Reversal: Looking at the problem backwards. Storyboarding: Creating a visual story to explore or explain. Value Analysis: Finding a high-value focus for innovation. Visioning: Creating a motivating view of the future.	5
V	TOOLS FOR CREATING IDEAS	Absence Thinking: Think about what is not there. Art streaming: Keep creating until you get through the blocks. Assumption Busting: Surfacing and challenging unconscious assumptions. Attribute Listing: Listing attributes of objects and then challenging them. Brainstorming: The classic creative method for groups. Brain drawing: Good for reticent groups. Brain mapping: Combining brain writing and mind-mapping. Brain writing: Group doodling for non-verbal stimulation. Breakdown: Careful decomposition to explore the whole system. Challenge: Challenge any part of the problem. Crawford Slip Method: Getting ideas from a large audience. A Day In The Life Of...: Building creative tension from contextualized situations. Delphi Method: Explore ideas or gain consensus with remote group. Doodling: Let your subconscious do the drawing. Essence: Looking elsewhere whilst retaining essential qualities. Forced Conflict: Using conflict to stimulate the subconscious. Guided Imagery: Letting your subconscious give you a message. How-How Diagram: Break down problem by asking 'how'. How to: Frame statements as 'How to' to trigger focused thinking. Incubation: Letting the subconscious do the work. The Kipling method (5W1H): Ask simple questions for great answers. Lateral thinking: Thinking sideways to create new ideas. Lotus Blossom: Unfold the flower of extended ideas. Chunking: Go up and then down elsewhere. Mind-mapping: Hierarchical breakdown and exploration. Modeling: For the artist in everyone. Morphological Analysis: Forcing combinations of attribute values. Nominal Group Technique: Getting ideas with minimal personal interaction. Pause: Think more deeply for a minute. Post-Up: Brainstorming with Post-It Notes.	6

		Provocation: Shake up the session by going off-piste. PSI: Problem + Stimulus = Idea! Random Words: Using a random word as a stimulus. Right braining: Combine incomplete doodles around the problem. Role-play: Become other people. Let them solve the problem. Remembrance: Remembering solutions not yet discovered. Reversal: Looking at the problem backwards. Reverse Brainstorming: Seek first to prevent your problem from happening. Rubber-ducking: Get someone else to listen to your talk. SCAMPER: Using action verbs as stimuli. Six Thinking Hats: Think comfortably in different ways about the problem. Storyboarding: Creating a visual story to explore or explain. Take a break: When creativity is fading. Talk streaming: Just talk and talk and talk until you unblock. TRIZ Contradiction Analysis: Use methods already used in many patents. Unfolding: Gradually unfolding the real problem from the outside. Value Engineering: Deep analysis to understand and innovate in areas of key value. Visioning: Creating a motivating view of the future. Wishing: State ideas as wishes to expand thinking. Write streaming: Write and write and write until you unblock.	
VI	TOOLS FOR SELECTING IDEAS	Concept Screening: Comparing options against a baseline benchmark. Delphi Method: Explore ideas or gain consensus with remote group. Force-field Analysis: Exploring forces for and against an idea. The Hundred Dollar Test: How will you spend \$100 on your ideas? The Kipling method (5W1H): Ask simple questions for great answers. Negative Selection: Sort out the 'definitely nots' first. NUF Test: Check idea is New, Useful and Feasible. Pause: Reflect for a minute before deciding. PINC Filter: Evaluate pros and cons of ideas. Six Thinking Hats: Look at ideas from different viewpoints. Swap sort: Sorting a short list by priority swapping. Voting: Democratic casting of votes for the best idea.	6
VII	TOOLS FOR SELECTING IDEAS	Adoption Checklist: A checklist of what leads to adoption. CATWOE: A checklist for thinking about problems and solutions. Changing Minds: The ultimate persuasion website. A Day In The Life Of...: Imagining how your solution will be used. Diffusion Lifecycle: Spreading ideas one group at a time. Force-field Analysis: Exploring forces that will support or oppose the idea. Head, Heart and Hands: Get all three systems of motivation engaged. How-How Diagram: Build plan by repeatedly asking 'how'. Mind-mapping: Use a mind-map to build a plan. Positives, Negatives: Look at both problems resolved and benefits gained. Purposing: Finding the real purpose of how the idea will be used. Remembrance: Remembering solutions not yet discovered. Reverse Planning: Working backwards from a perfect future. Role-play: Become other people you must persuade. Let them tell you what to say. Rubber-ducking: Talk about the problems you are facing to someone else. Six Thinking Hats: Look at the the idea from the viewpoint of your customers. Storyboarding: Creating a visual story to explore or explain. Why not?: Challenge objections and assumptions.	6

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments / Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work-25

Laboratory work- 20 Marks

Attendance- 05 Marks

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task: **15 marks**

Oral: **10 marks**

3. Evaluation of practical/oral examination to be done based on the performance of design task

4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

- 1) Thomas Richards, *Problem Solving: Best Strategies to Decision Making, Critical Thinking and Positive Thinking*
- 2) Arthur B. Vangundy, *101 Activities For Teaching Creativity And Problem Solving*
- 3) Cynthia Harris, *Creative and Critical Thinking*
- 4) Tom Kelley & Jonathan Littman & Tom Peters, *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*
- 5) Michael Michalko, *Thinkertoys: A Handbook of Creative-Thinking Techniques*
- 6) Michael Michalko, *Cracking Creativity: The Secrets of Creative Genius*
- 7) Edward De Bono, *Creativity Workout*
- 8) Rod Judkins, *The Art of creative thinking*, Sceptre Pub, 2015 2012

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theory	Studio	Theory	Studio	Total
BDL202	Drawing and Rendering	0	02	0	01	01

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL202	Drawing and Rendering	--	--	--	---	---	25	25	50

Course Objectives:

Sr. No.	Course Objectives
The course aims to :	
1	Focus of this course is to impart skills related to the preparation of detailed drawings for Design execution.
2	Emphasizes on aspects of sketching and rendering product ideas for presentation to internal and external clientele

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	INTRODUCTION TO VARIOUS MEDIA	Exploring different rendering media: pencils and watercolor for sketching different materials and their textures	08
II	MATERIAL AND TEXTURE SIMULATION	Acrylic, gel pens and markers for sketching to simulate different materials and textures	07

III	PRODUCT DRAWING FUNDAMENTALS	Product drawing fundamentals; Communicating 3D in 2D; Revisiting perspective drawing of products; light, shade and reflectivity; Representing design elements and material thicknesses; representing detail as required for guiding engineering	07
IV	DEPICTION OF USER EXPERIENCE THROUGH SKETCHING	Aspects of and exercises in sketching User experiences;	08
V	DIGITAL TOOLS	Introduction to digital tools and aids for sketching and rendering.	08

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments / Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

Distribution of marks for term work-25

Laboratory work- 20 Marks

Attendance- 05 Marks

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task: **15 marks**

Oral: **10 marks**

3. Evaluation of practical/oral examination to be done based on the performance of design task

4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

1. Drawing and Sketching Environments and Objects from your imagination, Scott Robertson with Thomas Bertling, Design Studio Press 2013 edition
2. Sketching: The Basics, Koos Eissen, Thames and Hudson 2013, ISBN-13: 978-9063692537
3. How to Render: The fundamentals of light, shadow and reflectivity, Scott Robertson with Thomas Bertling, Design Studio Press 2014 edition
4. Creating Textures in Pen & Ink with Watercolor, Claudia Nice, North Light Books, Ohio, USA
5. The Encyclopedia of Illustration techniques, Catharine Slade, Running Press
6. Bill Buxton, Sketching User Experiences: Getting the Design Right and the Right Design, Morgan Kaufman, Elsevier, 2007
7. M.N. Horenstein, Design Concepts for Engineers, Prentice Hall UK, 2002.

Course Code	Course Name	Teaching Scheme (Contact Hours)		Credits Assigned		
		Theor y	Studio	Theory	Studio	Tota l
BDL203	Design Studio-Problem Solving Process	0	04	0	04	04

Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract / Oral	Total
		Internal Assessment			End Sem Exam	Exam Duration (in Hrs)			
		Test1	Test2	Avg.					
BDL203	Design Studio-Problem Solving Process	--	--	---	--	---	50	50	100

Course Objectives:

Sr. No.	Course Objectives
The course aims:	
1	This course intends to provide an early introduction to methods of soliciting opinion from customers or users that will be required for a design learner to know going further.
2	To provide a first-hand experience to students working in teams at identifying a problem/opportunity and arriving at ways to (re)solve them through design intervention.

DETAILED SYLLABUS:

Sr. No.	Module	Detailed Content	Hours
I	Questions as measure	Overview and characteristics of questions and answers that affect measurement	4
II	Questioner design	Designing questions to gather factual data; question objectives; concepts and terms; reducing the effect of social desirability on answers; questions to measure subjective states; describing and evaluating people, places and things; handling relativity	4

III	Survey Design and analysis	General rules for designing good survey instruments; wording, asking and training respondents; Evaluation of questions, assessing their validity and basic statistics	10
IV	Problem Solving Processes	Aspects of Design Thinking process; Being open to problems, identifying and scoping needs; Aspects of design assuming a user-centered philosophy; Basic research methods and prototyping; Aspects of making and testing early prototypes	8
V	Problem Solving Exercise	Group project activity	14

Note: Suggested List of Experiments is indicative. However, flexibility lies with individual course instructors to design and introduce new, innovative and challenging experiments / Lab work (limited to maximum 30% variation to the suggested list) from within the curriculum, so that the fundamentals and applications can be explored to give greater clarity to the students and they can be motivated to think differently.

Assessment:

**Distribution of marks for term work-50 Laboratory work-40 Marks
Attendance-10 Marks**

ASSESSMENT:

End Semester Practical/Oral examination:

1. Each student will be given a small task of design/ Sketch/ Small activity based on syllabus, which will be assessed by pair of examiners during the oral examination.

2. Distribution of marks for practical-oral examination shall be as follows:

Design / Sketch/ Small activity Task: **30 marks**

Oral: **20 marks**

3. Evaluation of practical/oral examination to be done based on the performance of design task

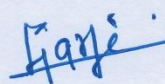
4. Students work along with evaluation report to be preserved till the next examination

Text Books and References:

1. Improving Survey Questions: Design and evaluation, Floyd J. Fowler, Jr. Applied Social Research Methods Series, Volume 38, Sage Publications, 1995 ISBN 0-8039-4582-5
2. Survey Methods and Practices, Statistics Canada, Published by authority of the Minister responsible for Statistics Canada, Minister of Industry 2010. ISBN 978-1-100-16410-6
3. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", Sep 2009, Tim Brown, Harper Business, Hardcover: ISBN-13: 978-0061766084
4. "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", Nov 10, 2009, Thomas Lockwood, Allworth Press; 1st edition, ISBN-13: 978-1581156683
5. "Product Design: Fundamentals and Methods", Roozenburg and Eekels, Publisher: John Wiley & Sons Inc; New edition, 1995
6. Bill Buxton, Sketching User Experiences: Getting the Design Right and the Right Design, Morgan Kaufman, Elsevier, 2007
7. "Wireframing Essentials: An introduction to user experience design", Matthew J Hamm, PACKT publishing 2014, ISBN 978-1-84969-854-2



Dr. Deven Shah
Offg. Associate Dean
Faculty of Science and Technology



Dr. Shivram Garje
Offg. Dean
Faculty of Science and Technology

Appendix B

Justification for
B. Des. (Industrial Design)

1.	Necessity for starting the course:	The course will help to design industry relevant engineering solution based on customers' requirements
2.	Whether the UGC has recommended the course:	AICTE has recommended the course
3.	Whether all the courses have commenced from the academic year 2023-24	Yes
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?:	Courses are run at the affiliated college and follow AICTE approval Process where the faculty requirement is mandatory
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	4
6.	The intake capacity of each course and no. of admissions given in the current academic year:	30
7.	Opportunities of Employability / Employment available after undertaking these courses:	Employability being high in Indian manufacturing industry.


Dr. Deven Shah
Offg. Associate Dean
Faculty of Science and Technology


Dr. Shivram Garje
Offg. Dean
Faculty of Science and Technology