Programme Specification

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Programme: Bachelor of Vocation(B.Voc)

in Product Design and Modelling

Faculty of Art and Design

Directorate of Training and Lifelong Learning

M. S. Ramaiah University of Applied Sciences

University House, New BEL Road, MSR Nagar, Bangalore – 560 054

www.msruas.ac.in

Director – Training and Lifelong Learning
Ramaiah University of Applied Sciences

Dean - Academics
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Registrar
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Programme Specifications and Course Specification

Vocational Diploma, Vocational Advanced Diploma, Bachelor of Vocational Degree in Product Design and Modelling

1. **Title of the Awards**

   Vocational Diploma in Product Design and Modelling

   Vocational Advanced Diploma in Product Design and Modelling

   Bachelor of Vocational Degree in Product Design and Modelling

2. **Modes of Study**

   Full-Time

3. **Awarding Institution /Body**

   M.S. Ramaiah University Of Applied Sciences – Bangalore, India

4. **Joint Award**

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5. **Teaching Institution**

   Faculty of Art and Design

   M S Ramaiah University of Applied Sciences - Bangalore, India

6. **Date of Programme Specifications**

   May 2016

7. **Date of Programme Approval by the Skill and Vocational Training Council of MSRUAS**

   May 2016

8. **Programme Benchmark**

   UGC Guidelines

9. **Rationale for the Course**

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Indian Engineering and Design sector has witnessed a combined growth rate of about 15 percent touching US$ 26.4 billion over the last year driven by increased national and global demand for its produce. India is on the quest to showcase its development power globally while promoting locally designed and developed products with its Make in India campaign.

Many local and international firms such as TATA Motors, GMR, Suzuki, Hyundai, TVS, GE, Ford, Samsung, Godrej, Royal Enfield, to name a few have set up R&D and Design centers in India to develop innovative products and offerings. To cater to these industries, helping them visualize their conceptual ideas physically, skilled model makers are required. There is remarkable potential for model makers in the industry today as there is an enormous dearth of skilled labor in this ever-growing sector.

This course provides the prospective students with a strong foundation of the art of creating scaled models and prototypes of the concepts envisioned by prestigious R&D and Design centers in India and abroad. Bangalore with its industrial areas located in various locations such as Peenya, Dobaspet, Bidadi, Harohallli, Jigani, Bommasandra, Electronic City, Whitefield and Hebbal provide an ideal platform for students to learn and work in an Industrial environment.

10. Program Aim

The aim of the program is to develop skilled professionals who can create models of product concepts based on the requirements of the Engineering and Design Industry.

11. Program Objectives

1. To impart knowledge on general education including material science, mechanics, electrical and electronics, computer applications, economics and sociology
2. To impart training on effective application of the elements of design to build forms and structures to communicate ideas of products and systems
3. To use appropriate materials to realize intended design ideas
4. To impart training on physical and virtual tools to accurately model and build a design concept to meet client requirements
5. To impart knowledge on managerial subjects and general subjects like principles of management, accountancy, customer relationship, behavioral skills,

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communication skills, for successful operation of product model making business

12. Program Specific Outcomes

The program specific outcomes are listed under three headings:

1. Knowledge and Understanding 2. Practical Skills and 3. Capability/Transferable Skills.

12.1 Knowledge and Understanding

After undergoing this course, the student will be able to :

1. Explain the principles involved in general education
2. Describe the application of design elements for creating three dimensional forms
3. Describe the tools and techniques for creating virtual and physical models using appropriate materials
4. Read and understand various safety regulations, labour laws connected with model making and manufacturing Industry

12.2 Practical Skills

After undergoing this course, the student will be able to :

1. Prepare and interpret 2D drawings to create representational physical models
2. Practice construction of various 3D forms and structures
3. Operate various equipment and machinery involved in cutting and finishing raw materials for model making
4. Build mock up models and prototypes using appropriate material and surface finishes

12.3 Capability/Transferable Skills

After undergoing this course, the student will be able to :

1. Develop a project report to set up a model making studio
2. Manage operations, finances, accounting and tax calculations

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3. Communicate effectively with suppliers and customers
4. Build team and manage team
5. Use modern ICT tools for efficient operation of the model making business

13. Programme Structure

A student is required to successfully complete the following modules for the award of the degree. The course is delivered as per the Time-Table for every batch.

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19 **Programme Structure**

Vocational Diploma

Semester-1

General Education: 12 Credits, 180 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE017	Communication skills-1	4	60
2	VGE021	Computer Applications - 1	4	60
3	VGE008	Basic Electrical Systems	4	60
Vocational Education: 18 Credits, 270 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD001	Foundation Sketching	6	90
2	VPD002	Manual Rendering	6	90
3	VPD003	Physical Form Exploration	6	90

Semester-2

General Education: 12 Credits, 180 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE033	Engineering Mechanics	4	60
2	VGE022	Computer Applications - II	4	60
3	VGE034	Environmental Science	4	60
Vocational Education: 18 Credits, 270 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD004	Materials for Product Modelling	6	90
2	VPD005	CAD Drawing	6	90
3	VPD006	Physical Model Making I	6	90

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20 **Programme Structure**

Vocational Advanced Diploma

Semester-1

General Education: 12 Credits, 180 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE027	Electronic systems	4	60
2	VGE066	Communication skills -2	4	60
3	VGE064	Elements of Social Science and Ethics	4	60
Vocational Education: 18 Credits, 270 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD007	3D Virtual Modelling	6	90
2	VPD008	Digital Product Illustration	6	90
3	VPD009	Physical Model Making II	6	90

Semester-2

General Education: 12 Credits, 180 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE005	Banking & Taxation	4	60
2	VGE013	Business Communication	4	60
3	VGE049	Materials for Product Development	4	60
Vocational Education: 18 Credits, 270 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD010	3D Surface Modelling – I	6	90
2	VPD011	Model Machining Processes	6	90
3	VPD012	Physical Model Detailing and Surface Finishing	6	90

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1 **Programme Structure**

Vocational Degree

Semester-1

General Education: 12 Credits, 180 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE059	Principles of Management	4	60
2	VGE069	Cost Estimation and Project Management`	4	60
3	VGE070	Mechanism for Product Design	4	60
Vocational Education: 18 Credits, 270 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD013	Design Essentials	6	90
2	VPD014	3D Surface Modelling – II	6	90
3	VPD015	Group Project -1	6	90

Semester-2

General Education: 10 Credits, 150 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VGE047	Labour laws, occupational health and safety	4	60
2	VGE068	Entrepreneurship development	4	60
3	VGE056	Organizational Behaviour	4	60
Vocational Education: 20 Credits, 300 Hours				
S. No.	**Code**	**Module Title**	**Credit**	**Hours**
1	VPD016	Work Portfolio	6	90
2	VPD017	Reverse Engineering and Rapid Prototyping	6	90
3	VPD018	Group Project-2	6	90

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14. Delivery Structure

The course is in a semester pattern with an average of 30 hours of interactions per week and 15 weeks per semester

15. Teaching and Learning Methods

The module delivery comprises of a combination of few or all of the following:

1. Face to Face Lectures using Audio-Visuals
2. Demonstrations
3. Laboratory/Field work/Workshop
4. Industry Visit
5. Group Exercises
6. Project Exhibitions
7. Technical Festivals

16. Assessment and Grading

Each module is assessed for a total of 100 marks with two tests each of 25 marks and a final examination of 50 marks for general education modules and similar pattern is followed for vocational based modules with emphasis on skills. A candidate is required to score a minimum of 40% overall in each of the modules.

It is compulsory to attend both the exams (at least one test and exam)

17. Failure

If a student fails in a module, he/she is required to take up the make-up examination.

18. Attendance

A student is required to have a minimum attendance of 75% in each of the modules.

19. Award of Class

As per the Academic Regulations for Vocational Programme.

20. Student Support for Learning

Student are given the following support:

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1. Module notes
2. Reference books in the library
3. Magazines and Journals
4. Internet facility
5. Computing facility
6. Laboratory facility
7. Workshop facility
8. Staff support
9. Lounges for discussions
10. Any other support that enhances their learning

21. Quality Control Measures

Following are the Quality Control Measures:

1. Review of module notes
2. Review of question papers
3. Student feedback
4. Moderation of assessed work
5. Opportunities for the students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff student consultative committee meetings
8. Student exit feedback
9. Subject Assessment Board
10. Programme Assessment Board

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Diploma

Semester 1

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Course Title	Communication skills-1
Course Code	VGE017
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to provide an effective communication as an integral part of life. Communication is a process of exchanging ideas, messages, information etc. through verbal or nonverbal communication. In this course, the focus will be on improving skills- listening, speaking, reading and writing.

Course Outcomes

After undergoing this course students will be able to:

CO1 Understand the importance of communication skill
CO2 Familiar with the complete business communications procedures and techniques
CO3 effective business correspondence with brevity and clarity
CO4 Demonstrate his/her ability to write error free while making an optimum use of correct Business Vocabulary & Grammar

Course Contents

Unit 1(Communication Skills Process of communication): Terminologies used in communication process, Communication barriers, Active listening

Unit 2(Types of communication): Verbal and non-verbal Communication, Sentence formation, Types sentence, Different parts of speech

Unit 3 (Importance of spoken skills): Adjectives and articles, Verbs and preposition, Present and past tense, Future tense Use of participles in different tenses, , usage of tenses, Competent pronunciation

Unit 4 (Appropriate use of language): Appropriate use of tone, pitch and volume, Practice -Use of tone, pitch and volume

Unit5 (Preparation for extempore): Mind mapping for speaking readiness, Content of extempore – beginning, Body and conclusion

Unit 6 (Conversation manners): Stages of conversation – introduction feed forward, close, order of introduction, conversation barriers

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Unit 7 (Reading and the Techniques): Skimming, Scanning and reading in details, Paragraph Writing, Structure of a paragraph – topic sentence, supporting sentence

Unit 8 (Reading and the Techniques): Conclusion sentence, functions of paragraph, Paragraph patterns, paragraph writing principles – coherence, unity, order, length Practice,

Unit 9 (Comprehension and Practice): Purpose of comprehension, Low-level comprehension, High - level comprehension Practice, Precis Writing- Paraphrasing techniques, Usage of appropriate words.

Course Resources

a. Essential Reading

1. Class Notes
2. Chaturvedi P. D, Chaturvedi M. (2011) Business Communication: Concepts, Cases and Applications. Pearson Education India. ISBN: 8131718727.

McGraw Hill

b. Recommended Reading

1. C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.

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Course Title	Computer Applications-1
Course Code	VGE021
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to Work effectively with a range of current, standard, Office Productivity software applications solving a range of problems using office productivity applications, and adapt quickly to new software releases.

Course Outcomes

After undergoing this course students will be able to:

CO1 Evaluate and use office productivity software appropriate to a given situation
CO2 Ability to create and edit documents, spread sheets, and presentations
CO3 develop and presentation of material produced by office productivity applications.
CO4 prepare the documents for office and personal work

Course Contents

Unit 1 Introduction to Computers, History of Computing, Computer Hardware/Software Components, Operating Systems, MS Office Word Identifying and Exploring the Word Window,

Unit 2(Introduction): MS Office Word Understand and use the toolbars. MS Office Word Applying basic formatting techniques, Use and learn the different available functions, Word - Save, open and print a document, MS Office Word Creating a Table, Table of Contents, Index, and applying styles to documents, PPT Creating and Opening Presentations,

Unit 3 Pre-Designed Slide Layouts, Word Different Views in MS PowerPoint, Templates and presentation graphics, Using the Research Task Pane and other functions Creating Speaker Notes and setting up slides, Previewing and printing a presentation,

Unit 4 Understand the use of spreadsheets and Excel, Excel - Scroll through a worksheets and navigate, Gain knowledge of the basic features and facilities of spreadsheets, Use Formulas, Format and Enhance Data,

Unit5 Excel - Create Charts and Graphs from a Spreadsheet and use Functions, Absolute Reference and Conditional Formatting

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Course Resources

a. Essential Reading

John Monyjok Maluth (2016) Basic Computer Knowledge

b. Recommended Reading

Dr. S. S. Srivastava, (2008) MS-Office

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software

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Course Title	Basic Electrical System
Course Code	VGE0008
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to provide a reasonable understanding on the basics of applied electricity is therefore important for every engineer. Apart from learning d.c and a.c circuit analysis both under steady state and transient conditions, you will learn basic working principles and analysis of transformer, d.c motors and induction motor. Finally working principles of some popular and useful indicating measuring instruments are presented.

Course Outcomes

After undergoing this course students will be able to:

CO1 Understand the basic electrical systems
CO2 Students will gain knowledge regarding various methods of electrical systems
CO3 Student will gain knowledge digital electronics
CO4 Student will gain knowledge on electronic systems and its applications

Course Contents

Unit 1 Analysis of D.C Circuits : Introduction, Concept of E.M.F, potential difference, current, ohm's law, resistance, Resistivity, effect of temperature on resistance, Kirchhoff 's laws, Voltage division and current division principles, Ideal and practical voltage and current sources, Mesh analysis, Identification of Resistor (Colour Code), demonstration

Unit 2 Single-phase AC Circuits: Generation of Sinusoidal Voltage Waveform (AC) and Fundamental Concepts, RMS and Average value, form factor , crest factor, Phasor relationship of pure R,L and C, Power and power factor for R,L and C circuits

Unit 3 Magnetic circuits : Fundamental concepts of magnetic circuit, Magnetic Flux, magnetic flux density, MMF, Reluctance, Permeability and magnetizing force, leakage and fringing flux, Analogy between magnetic and electric circuits, Ohm's law and Kirchhoff 's laws in magnetic circuits, Oersted experiment, Magnetic effect of electric current, Classification of magnetic materials, demonstration

Unit 4 Electromagnetic Induction: Introduction, Faraday's laws of electromagnetic Induction, Classification of Induced E.M.F, Direction of induced E.M.F,

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Unit5 Domestic Wiring: Introduction, Wiring materials and accessories, Types of wiring systems, Circuit to control one lamp with one switch, Circuit to control one lamp with two 2-way switch, Study of Home Appliances such as Heater, Electric Iron and FANS etc.,

Unit 6 D.C Generators : Introduction, Constructional Features of D.C Machines, working principle of D.C generator, Types of D.C generators, Applications of D.C generators, demonstration

Unit 7 D.C Motors : Introduction & working principle of D.C motor, Types of D.C motors and its applications, Demonstration

Course Resources

a. Essential Reading

1. Class Notes
2. Rohit Mehta and V.K. Mehta , (2006) Basic Electrical Engineering ,

b. Recommended Reading

1. I. J. Nagrath, (2001) Basic Electrical Engineering, Tata McGraw-Hill Education, 01-Dec-2001

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Course Title	Foundation Sketching
Course Code	VPD001
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students basic methods, principles and conventions used in foundation sketching's. The students are taught drafting techniques to develop various views. The students are also taught to create freehand pictorial presentation drawings.

Course Outcomes

After undergoing this course students will be able to:
CO1 Describe the methods and drawing basic drawing

CO2 Discuss the principles and techniques used to develop various views of pictorial representation

CO3 Create isometric and oblique sketches

CO4 Proficiently use single point two point and three point perspective for manual sketching and
shading

Course Contents

Unit 1 Introduction Curvilinear & Rectilinear Lines, Implied Or Actual Lines, Lines Used As Value & Contour Lines, Contour Line & Its Types, Gestures Of Living and Their Dynamisms, Non-living Objects and Their Dynamisms, Focal Point As Center Of Interest, Overlapping As Visual Separation Of A Drawing By Layering Objects, Hatching And Its Techniques And Variations

Unit 2 Basic Shapes- Structure, Anatomy, Geo forms, Human Anatomy - Proportions

Unit 3 Still Life of objects, Still Life (composition with shading)

Unit 4 Introduction to Perspective, One Point , two Perspective, Drawing Geo Forms in Perspective, Perspective Drawing Techniques

Unit 5 Working with Volume

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Course Resources

a. Essential Reading

1. Ching, F. and Juroszek, S. (2010) Design Drawing, 2nd Edition, AIA, Wiley

b. Recommended Reading

1. Styles, K. and Bichard, A. (2004) Working Drawings Handbook, 4th edn, Routledge

Course Title	Manual Rendering
Course Code	VPD002
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students with a foundation in shading technique to develop skills to create and present their idea. The students are taught the process of representing images used to communicate
ideas through visually. They are also thought the light, rendering technique.

Course Outcomes

After undergoing this course students will be able to:

CO1 Apply colors and shading technique

CO2 Apply the light and shading technique

CO3 Apply colors and texture technique

CO4 Create visual representations and finished designs for presentation

Course Contents

Unit 1 Introduction – Manual rendering materials, Direct Hard Light and soft light, Multiple Light source, Reflective Light, Fundamentals of Casting Shadows, Directions of Light Planes, Casting Shadow of Stick, Shadow construction with local light, Local Light Shadow construction: Multiple Sticks on a Single Level

Unit 2 Sunlight Construction, Casting Shadow of Wall over Obstacles, Rendering Geo Forms: Lighting strategies for Box Forms, Rendering Geo Forms: Lighting strategies for Box Forms, Reflective Light – creating the value,

Unit 3 Rendering Curved Surfaces: Introduction, Rendering Curved Surfaces: Cone, cylinder, and sphere

Unit 4 Shading Simple Curved Surface, Cut Lines, Graphics and Texture, Rendering Specific Materials: Introduction, Gloss Surface Exercise, Glass Surface Exercise, Chromium Surface Exercise, Texture Surface Exercise Wood Surface Exercise, Render presentation Techniques

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Course Resources

a. Essential Reading

1. Michael J. (2013), Burn Your Portfolio: Stuff They Don't Teach You in Design School, New Riders

b. Recommended Reading

1. Carolyn K. , Jessica G., (2010), The Graphic Design Exercise Book, HOW Books

c. Other Electronic Resources

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Course Title	Physical Form Exploration
Course Code	VPD003
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students to understand the tools, techniques and processes involved in model making. An overview of materials like clay, Plaster of Paris, sunboard, cardboard and sheet metal used in model making are covered. Students are trained to create form exploration models, using basic model making tools and materials.

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe various processes involved in physical model making
CO2 Explain various tools and machines used for model making
CO3 Choose appropriate materials to achieve desired form and finish in a physical model
CO4 Create form exploration models with different materials

Course Contents

Unit 1 Introduction to Physical Form Exploration, Basic form and their attributes, Expression of form, Selection and combination of linear planner, Selection and combination volumetric characteristics, Additive and subtractive nature of form, 2D form Transition and Exploration, 3D form transition, Exploration of 3D form.

Unit 2 Form exploration using paper, Paper art exercise

Unit 3 Metaphors as an form, Their imaginative use to generating complex form and structures, Use of combinatorics as a method of 3D form generation, Relationship between form material and process, Form exploration in context of products

Unit 4 Form exploration using Card board, Cardboard art exercise

Unit 5 Polystyrene (thermocol) – properties, exploration, Working on polystyrene- template making, cutting and finishing, polystyrene exercise

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Course Resources

a. Essential Reading

1. Hallgrimsson, B. (2012) Prototyping and Model making for Product Design, Laurence King Publishers.

b. Recommended Reading

1. Yadav, S.K. (2006) Workshop Practice, Discovery Publishing House.

2. Agostinho, S., Bennett, S., Lockyer, L. and Harper, B. (2011) 'The Future of Learning

c. Other Electronic Resources

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Diploma Semester 2

Course Title	Engineering Mechanics
Course Code	VGE033
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students to understand and applying the principles required to solve engineering mechanics problems. The course addresses the modeling and analysis of static equilibrium problems with an emphasis on real world engineering applications

Course Outcomes

After undergoing this course students will be able to:

CO1 understand the basic engineering mechanics and applications in design

CO2 Calculate the centroid, first moment and second moment of area

CO3 Understand the velocity and acceleration of rigid bodies and its applications

CO4 Analyze the forces acting on rigid body during translation motion.

Course Contents

Unit 1 Introduction-Engineering Mechanics , Divisions of Engineering Mechanics, Kinematics and Dynamics

Unit 2 Composition and Resolution of Forces, Effects of a Force, Characteristics of a Force , Fundamental Laws of Forces - Parallelogram Law of Forces, Resolution of a Force, Triangle Law of Forces & Polygon Law of Forces, Moments and Their Applications, Moment of a Force, Representation of Moment. Applications of Moments, Equilibrium of Forces, Principles of Equilibrium

Unit 3 Forces and the Laws of Motion, Laws of motions, Practice, Centre of Gravity- Centroid, Methods for center of gravity, Moment of Inertia and practice.

Unit 4 Principles of Friction, Laws of Kinetic or Dynamic Friction, Applications of Friction, Practice exercise

Unit 5 Motion in One Dimension, Two-Dimensional Motion and Vectors, Practice exercise, Work, Energy and Power, Practice exercise

Unit 6 Hydrostatics, Intensity of Pressure, Practice exercise, PASCAL'S LAW, Practice exercise, Equilibrium of Floating Bodies, Archimedes' Principle, Buoyancy, Types of Equilibrium of a Floating Body, Metacenter , Practice exercise

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Course Resources

a. Essential Reading

1. Course Notes

Russell Hibbeler (2006) Engineering Mechanics: Statics & Dynamics, 14th Edition, pear publication

b. Recommended Reading

1. R.K. Bansal (2008) , A Textbook of Engineering Mechanics (5th Edition)

c. Other Electronic Resources

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Course Title	Computer Applications -II
Course Code	VGE022
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to Work basic internet applications. Browsing is mainly looking into the content of Internet using the hyperlinks. Good browser and keep to update in the browser, Internet can learn any digital signals such as text, graphics, sound, video and animation.

Course Outcomes

After undergoing this course students will be able to:

CO1 explain the term browsing and perform browsing on the Internet
CO2 identify and use the basic features of email services
CO3 identify and use basic models of chat
CO4 prepare the documents for office and personal work

Course Contents

Unit 1 Knowing Computer: Basic Applications of Computer, Concept of Computing, Data and Information, Bringing computer to life: Connecting keyboard, mouse, monitor and printer to CPU and checking power supply, Basics of Operating System

Unit 2(Introduction): User Interface and setting simple Operating System, File and Directory Management, Basic of Computer Networks: LAN, WAN and MAN, Internet: Concept of Internet, Applications of Internet, Connecting to the Internet and Troubleshooting

Unit 3 Introduction to WWW and Web browsers, Search Engines, Understanding the URL and Surfing the web, Basics of E-mail and Using E-mails, Document collaboration and Instant Messaging and Collaboration, Types of electronic communications, Online safety rules and regulations

Unit 4 Introduction to other software or websites, Setting up an Internet connection, IP address and other wireless activities, Introduction to Mobile applications, apps, connectivity and other kinds of operating systems,

Unit5 Introduction to Cloud Computing, Google Drive, Dropbox and the connectivity, Introduction to Computer Graphics, Games and Animation,

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Course Resources

a. Essential Reading

John Monyjok Maluth (2016) Basic Computer Knowledge

b. Recommended Reading

Dr. S. S. Srivastava, (2008) MS-Office

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software

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Course Title	Environmental Science
Course Code	VGE034
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with essential aspects of environmental science. The students are taught various issues associated with natural resources and concepts of ecosystems, conservation of the biodiversity and environmental pollution. The students also learn about social issues associated with the environment and the impact of human population on the environment.

Course Outcomes

After undergoing this course students will be able to:

CO1. Explain the multidisciplinary nature of environmental study
CO2. Classify and explain the various natural resources and their associated problems, ecosystems and environmental pollution
CO3. Discuss various social issues pertaining to the environment including sustainable development, energy issues and disaster management
CO4. Discuss biodiversity at local, national and global levels

Course Contents

Unit 1(Introduction to Environmental Science): Environment and related terms, Importance of Environmental science, Environmental issues and public awareness

Unit 2(Natural resources): Different natural resources such as Forest, Water, Mineral, Food, and Land, Threats to natural resources, Conservation of resources, Various measures to preserve natural resources, Role of an individual in conservation of natural resources

Unit 3 (Energy resources): Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources

Unit 4 (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, Different types of ecosystems

Unit 5 (Biodiversity): Biodiversity and its components, Importance of biodiversity, Value and usage of biodiversity, Threats to biodiversity, Conservation of biodiversity, Biodiversity at global, national and local levels.

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Unit 6 (Environmental Pollution): Definition, causes, effects and control measures of air, water pollution, soil, marine, noise, thermal and nuclear pollution, Solid waste management. Effects and control measures of urban and industrial wastes, Prevention of pollution

Unit 7 (Disaster management): Aims of disaster management, Stages of disaster management, Role players in disaster Preparedness

Unit 8 (Social Issues and the Environment): Urban problems and related to energy, Rain water harvesting, Watershed management, Environmental Ethics, Issues and possible solutions, Greenhouse gases , Global warming and its effects, Effects of acid rain, Ozone layer depletion, Law for environmental protection, Issues involved in enforcement of environmental legislation

Unit 9 (Human Population and the Environment): Population growth, Environment and human health, Human rights, Value education, Women and child welfare, Role of information technology in environment and human health

Course Resources

a. Essential Reading

2. Class Notes
3. Bharucha, E. (2004) Environmental Studies. New Delhi: University Grants Commission

b. Recommended Reading

1. Jadhav, H. and Bhosale, V. M. (1995) Environmental Protection and Laws. Delhi: Himalaya Publishing House

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Course Title	Materials for Product Modelling
Course Code	VPD004
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students to understand the physical modelling materials and tools, techniques and processes involved in model making. An overview of materials like clay, wood ,Plaster of Paris, sunboard, acrylic and sheet metal used in model making are covered.

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain the physical model making materials

CO2 Describe various processes involved in physical model making

CO3 Explain various tools and machines used for model making

CO4 Choose appropriate materials to achieve desired form and finish in a physical model

Course Contents

Unit 1 Introduction to physical model making materials, Wood – types, properties, role in product modelling, Working on wood – cutting and turning

Unit 2 Clay- types, properties, role in product modelling, Working on Clay – mixing creating shapes, Hands on experience using clay

Unit 3 Aluminium wire - properties, role in product modelling, Working on Aluminium – wireframes, Hands on experience on Aluminium

Unit 4 Acrylic- types, properties, role in product modelling, Working on Acrylic, Hands on experience on Acrylic.

Unit 5 Card board/ mount board - types, properties, role in product modelling, Card board/ mount board - types, properties, role in product modelling

Unit-6 : MDF - properties, role in product modelling, Working on MDF, Hands on experience on MDF

Unit-7 Bamboo - types, properties, role in product modelling, Hands on experience on Bamboo

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Unit 8 Sun board - types, properties, role in product modelling, Hands on experience on Sun board

Unit 9 High Impact Polystyrene Sheet - types, properties, role in product modelling, Hands on experience on High Impact Polystyrene Sheet

Course Resources

a. Essential Reading

1. Ashby, M. and Johnson, K. (2009) Materials and Design: The Art and Science of material Selection in Product Design, 2nd revised edn, Butterworth- Heinemann Ltd
2. Hallgrimsson, B. (2012) Prototyping and Model making for Product Design, Laurence King Publishers.

b. Recommended Reading

1. Yadav, S.K. (2006) Workshop Practice, Discovery Publishing House.
2. Agostinho, S., Bennett, S., Lockyer, L. and Harper, B. (2011) 'The Future of Learning

c. Other Electronic Resources

Laboratory

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Course Title	CAD Drawing
Course Code	VPD005
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with deals with graphical representation of geometrical entities in various views for visualization and communication. The students will be taught orthographic projection of points, lines, planes, solids and isometric projection of solids. The students will also be trained to use CAD tool to carry out the industrial drawings

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe the conventions used in projections of geometric entities and interpret the same

CO2 Sketch and draw orthographic and isometric projections for the geometric entities in specified positions

CO3 Draw orthographic and isometric projections for complex geometries.

CO4 Demonstrate competency in using CAD tool for drawing geometric projections

Course Contents

- Unit 1 Introduction to Engineering Graphics and CAD Tool. Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing.
- Unit 2 Introduction to CAD Tool: Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Creation of geometric entities and text. Applying constraints and editing of geometric entities. Dimensioning and line conventions.
- **Unit 3** Orthographic Projections: Lines, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (simple problems only), Reproduce using CAD Tool

  Unit 4 Introduction, Section planes, Sections, Section views, Apparent shapes and True shapes of Sections of right regular prisms and cylinders resting in simple positions. Reproduce using CAD Tool

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Unit 5 Isometric Projection (Using Isometric Scale Only), Isometric scale, Isometric projection of simple solids – prisms, pyramid, Isometric projection of simple solids – cylinders and cones Reproduce using CAD Tool

Unit 6 2D Part drawings with layers and dimensions created from the CAD Tool Exercise

Unit 7 2D Assembly drawings created from the CAD tool- Exercise

Unit 8 2D Assembly drawings and Bill of material created from the CAD tool- Exercise

Course Resources

a. Essential Reading

1. Class Notes
2. N.D. Bhatt and V.M. Panchal, (2006) Engineering Drawing, 49th Edn, Charotar Publishing House, Gujarat.
3. K R Gopalakrishna, (2005) Engineering Graphics, 32nd Edn, Shubhash Publishers, Bangalore.

b. Recommended Reading

1. Luzadder W.J., (2006) Fundamentals of Engineering Drawing, 11th Edn, Prentice Hall India.
2. CAD Tool Users Manuals

c. Other Electronic Resources

Autocad Software , Personal Computer

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Course Title	Physical Model Making-I
Course Code	VPD006
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course deals with to enable the students to understand the tools, techniques and processes involved in model making. An overview of materials like clay, thermocol, Plaster of Paris, sunboard, bamboo used in model making are covered. Students are trained to create form exploration models, using basic model making tools and materials.

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe various processes involved in physical model making
CO2 Explain various tools and machines used for model making

CO3 Choose appropriate materials to achieve desired form and finish in a physical model

CO4 Create form exploration models with different materials

Course Contents

Unit 1 Introduction to physical Model Making, Physical Model Making using Wood as medium, Physical Model Making using Wood as medium

Unit 2 Physical Model Making Using Polystyrene (thermocol) as medium,

Unit 3 Physical Model Making using Clay

Unit 4 POP- Types, Properties, role in Product Model Making, POP Casting

Unit 5 Physical Model Making using PU Foam

Unit 6 Physical Model Making using Sun Board

Unit 7 Physical Model Making using Bamboo

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a. Essential Reading

3. Hallgrimsson, B. (2012) Prototyping and Model making for Product Design, Laurence King Publishers.

b. Recommended Reading

1. Yadav, S.K. (2006) Workshop Practice, Discovery Publishing House.

2. Agostinho, S., Bennett, S., Lockyer, L. and Harper, B. (2011) 'The Future of Learning

c. Other Electronic Resources

Laboratory

Advanced Diploma

Semester 1

Course Title	Electronic System
Course Code	VGE027
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to provide the student with the fundamental skills to understand the basic of semiconductor and components like diodes,operational amplifiers, rectifiers, inverters, regulators. It will build mathematical and numerical background for design of electronics circuit & component value. Students equipped with the knowledge and training provided in the course will be able to participate in design , development and operation in the different area of electronic systems.

Course Outcomes

After undergoing this course students will be able to:

CO1: To study basics of semiconductors and their applications in different areas.

CO2: To study different biasing techniques to operate transistor , FET , MOSFET and operational amplifier in different modes.

CO3: Analyze output in different operating modes of different semiconductor devices.

CO4: Compare design issues, advantages, disadvantages, limitations, applications of basic electronic components

Course Contents

Unit 1 (Introduction to materials): Introduction to materials, Classification of materials based on energy level diagram, Semiconductors, Intrinsic semiconductor , Extrinsic semiconductor, p-type, n-type, p-n Junction diode, Biasing of p-n junction, forward biasing, reverse biasing, V-I characteristic of diode

Unit 2 (Rectifiers): Introduction to Rectifier, Half wave rectifier, Full wave rectifier, Full Bridge type and Centre tapped rectifier, Half wave rectifier with filter, Full wave rectifier with filter

Unit 3 (Amplifiers and Inverters): Introduction to amplifiers, Op-Amp IC, Ideal characteristics of Op-Amp, Op-Amp in different modes as inverting amplifier & non inverting amplifier, Op-Amp as a adder, subtractor, Inverters : Introduction , Types of Inverters

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Unit 4 (Regulators and UPS): Voltage Regulator: Introduction, Types of Voltage Regulator, UPS: Introduction , Different types of UPS

Unit 5 (LEDs and LCDs): Electronic Display : Introduction to LEDs, Types of LED, Seven segment display, Common anode and common cathode seven segment display, Fourteen segment display, Dot matrix display, LCD : Introduction, Types of LCD, Advantage & disadvantage of LCD and their applications

Unit 6 (8085 microprocessor): Introduction: Microprocessor 8085,Features of 8085 Microprocessor . Block Diagram of 8085 Microprocessor

Course Resources

a. Essential Reading

1. Class Notes
2. Electronic devices and circuit theory by Boylestad and Nashelsky, Pearson
3. 'Electronic principle by Albert Malvino & Davis J Bates, TMH
4. 'Solid state Electronics Devices' by Sreetman & Banerjee.

Reference books:

1. Principles of electronics by V K Mehta and Rohit Mehta, Chand.
2. 'Electronics devices & Circuit' by Salivahanan. TM

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Course Title	Communication Skills II
Course Code	VGE066
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to provide an effective communication as an integral part of life. Communication is a process of exchanging ideas, messages, information etc. through verbal or nonverbal communication. In this course, the focus will be on improving LSRW skills- listening, speaking, reading and writing. Students will learn how to communicate effectively though prescribed syllabus. Classroom assignments/activities specifically designed to encourage students to play an active role for enhancing their knowledge and developing learning strategies. Blended learning - online and traditional lectures with other active teaching methodologies, such as group discussions, cooperative group solving problems, quizzes, discussions and assignments enable students towards understanding various aspects of effective communication. Class participation is a fundamental aspect of this course student are encouraged to actively take part in all group activities and to give an oral group presentation. Through an experience-based curriculum, highly interactive exercises, and powerful presentation, students will become the type of communicator that others search for and remember. Students will not only notice a huge improvement, they will be having a lot of fun in this learning process.

Course Outcomes

After undergoing this course students will be able to:

CO1: Be familiar with the complete business communications procedures and techniques
CO2: Participate in an online learning environment successfully by developing the implication-based understanding of Paraphrasing, deciphering instructions, interpreting guidelines, discussion boards & Referencing Styles
CO3: Demonstrate his/her ability to write error free while making an optimum use of correct Business Vocabulary & Grammar
CO4: Distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization
CO5: Draft effective business correspondence with brevity and clarity
CO6: Stimulate their Critical thinking by designing and developing clean and lucid writing skills
CO7: Demonstrate verbal and non-verbal communication ability through presentations

Course Contents

Unit I: Prerequisites to Business Communication

- Paraphrasing

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- Deciphering Instructions
- Interpreting Guidelines
- Dos and Don'ts of participating in Online Discussion Boards and
- Referencing Styles (MLA, Chicago, APA)

Unit II: Enriching Business Vocabulary & Reading Skills

- Tenses/Passive Voice
- Conditional Sentences
- Common errors
- Building Blocks of Vocabulary
- Business Idioms and Collocations
- Reading and analysis of Business articles, short reports, success stories and caselets.

Unit III: Effective Business Communication

- Communication – An overview
- Origin, meaning and process of Communication
- Goals of Communication
- Organizational Communication
- Directions/Flow of Communication
- Barriers to Communication
- Cross-cultural/Intercultural communication

Unit IV: Critical Thinking & Writing Skills

- Mind Mapping
- Prerequisites to paragraph writing
- Methods of Paragraph Development
- Precis writing
- Abstract writing
- Summary writing

Unit V: The Writing Strategy in Business messages & Presentation skills

- Preparing Effective business messages (Planning steps, organizing content, drafting,
  beginning & ending. Proof – reading & final editing)
- Writing Good news, Bad news and Neutral messages
- How to draft Memo, agenda & Minutes of Meeting?
- Effective presentation skills
- Group Presentations (Organizational communication)

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Course Resources

a. Essential Reading

1. Mishra. B, Sharma. S (2011) Communication Skills for Engineers and Scientists. PHI Learning Pvt. Ltd. ISBN: 8120337190.
2. Chaturvedi P. D, Chaturvedi M. (2011) Business Communication: Concepts, Cases and Applications. Pearson Education India. ISBN: 8131718727.
3. Greenbaum. Sidney. College Grammar of English. Longman Publishers. ISBN: 9780582285972.

b. Recommended Reading

1. Pal, Rajendra and Korlahalli, J.S. (2011) Essentials of Business Communication. Sultan Chand & Sons. ISBN: 9788180547294.
2. Kaul, Asha. (2014) Effective Business Communication.PHI Learning Pvt. Ltd. ISBN: 9788120338487.
3. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.
4. C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.

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Course Title	Elements of Social Science and Ethics
Course Code	VGE064
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to familiarize students with the dynamics of society and importance of ethics in formation of an ideal society.

The course facilitates a better understanding of contemporary and ethical issues and problems prevailing therein. The course enables students to critically analyze the social processes of globalization, modernization and social change, and its impact on the sociocultural system.

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain society and ethics
CO2 Identify the factors comprising sociocultural system and its impact on the society
CO3 Identify social issues/problems/conflicts
CO4 Analyze the factors contributing to societal issues
CO5 Suggest possible solutions to the identified social / civic issues / problems / conflicts

CO6 Discuss the role of ethics for formation of an ideal society

Course Contents

Unit 1 Introduction

Introduction to the concept of society, Types of society, Determinants of society – beliefs, ideologies, customs and practices.

Unit 2(Socio – Cultural System)

The concept of interrelatedness of society and culture, socio-cultural dimensions, factors contributing to socio-cultural evolution.

Unit 3 Social Issues/Conflicts

Identify Issues / Problems / Conflicts in the society, Socio-cultural issues, Civic issues in the society, Causes attributed to people's behavior / beliefs / practices – Causes attributed to

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authorities – Causes attributed to technology – Causes attributed to nature, Lessons from history that could lead to a solution or prevention of Issues / Problems / Conflicts, Technological solution – Socio Cultural Solution – Legal Solution – Human Behavioral Solution.

Unit 4 Ethics Importance of Ethics, difference between morals, values and ethics, Relevance of ethics in 'practical' decision making- ethical dilemma, Scope of ethical behavior in various professions, Effects of unethical behavior on the society.

Course Resources

a. Essential Reading

1. Class Notes
2. C. N. Shankar Rao (2006) Sociology of Indian Society, 2nd, S. Chand publication
3. Singh, Uppendra. (2009), A History of Ancient and Medieval India, Pearson Education
4. India

a. Recommended Reading

1. Ashley D, Orenstein DM. (2005) Sociological theory: classical statements, 6th Ed. Pearson Education
2. Chaudhuri, Maitrayee. (2010) Sociology in India, Rawath publication
3. Singhal, K. C; Gupta, Roshan (n. D) The Ancient History of India, Vedic Period: A New Interpretation, Atlantic Publishers
4. Reddy, Krishna. (2003). Indian History, Tata McGraw Hill

b. Magazines and Journals

1. BBC History Magazine, owned by BBC Worldwide and published under license by the "Immediate Media Company Bristol Limited, Bristol, UK",
2. Economic Sociology, published by Blackwell Publishers, Oxford, UK
3. Journal of Indian Council of Historical Research, published by ICHR, New Delhi
4. Journal of Indian History and Culture, published by The Indian History and Culture Society, New Delhi

c. Websites

1. http://sociology.fas.harvard.edu/
2. http://asianhistory.about.com/od/india
3. http://www.indianhistorycongress.org.in/
4. http://www.historytoday.com/asia/

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d. Other Electronic Resources

1. Electronic resources on the course area are available on MSRUAS library

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Course Title	3D Virtual Modelling
Course Code	VPD007
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare students to learn and apply 3D modelling techniques to create digital models and understand the significance and principle of drawings. Students are taught solid modelling, assembly techniques, parametric sketching and data exchange formatting. Creating detailed drawings with applications of GD & T. Students are also trained to use appropriate software and tools to create 3D models, assemblies, detailed drawings.

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain various techniques involved in drawing and 3D modelling

CO2 Create 3D models based on parameters and constraints and interfacing

CO3 Develop parts and product assemblies using 3D modelling software

CO4 Create the detailing drawings and bill materials

Course Contents

Unit 1 - Introduction to CAD tools and applications: advantages and Disadvantages of CAD tools
Introduction to Catia tool, Demonstration of sketcher module and practice of sketcher commands
, Introduction to Catia tool, Demonstration of sketcher module and practice of sketcher commands, Basic hardware structure, Input and output devices, storage devices, Types of 3D modelling , wire frame modelling and Solid modelling, Introduction to Catia 3D modelling

Unit 2 Sketch based features : Pad, Pocket, Revolve, grove, Hole, simple 3D models Sketch based features , Rib, Slot, Solid Combine, Multi section solid, Remove multi section solid , practice of simple 3D models, Dress-up features, Fillet, Chamfer, Draft angle, Practice of simple 3D models, Transformations features : Translation, rotation, Mirror Rectangular, Circular and User pattern, scaling,

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Unit 3 : Exercise 3D models: Reference Element, Apply material, Measuring tool and practice, Two dimensional transformations, Date exchange formats, IGES, STEP,STL, Boolean operations, Knowledge tool bar and practice , Surface based tools and practice Practice of 3D part drawings -1

Unit 4 Introduction to Assembly drawings :advantages and applications, Introduction to Assembly drawings advantages and applications, Demonstration on Assembly in Catia, product structure tools and constraint and practice, Practice of assembly modelling

Unit5 - Drafting : Advantages and Applications , Introduction to Drafting in Catia, Detailing and generation of drawings from 3D models, Detailing and generation of Bill of materials and dimensions, Detailing of part drawing and assembly drawings

Course Resources

a. Essential Reading

1. Class Notes
2. Zeid, I. (1991) CAD/CAM Theory and Practice, McGraw-Hill Mechanical Engineering

b. Recommended Reading

1.Zeid, I. and Sivasubramanian, R. (2008) CAD/CAM Theory and Practice, Tata McGraw - Hill

2.Bhatt, N. and Panchal, V. (2006) Engineering Drawing, 49th edn, Charotar Publishing House, Gujarat

c. Other Electronic Resources

1. Laboratory
2. Hardware: Personal Computer
3. Software : Catia

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Course Title	Digital product Illustration
Course Code	VPD008
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to deals with essentials of representing ideas and sketches using digital media. Students are also taught to use vector based software. Students are trained with essential graphics and visual communication skills that they can use to enhance almost every aspect of their work. Students are also trained creates posters and prepare portfolio of their designs.

Course Outcomes

After undergoing this course students will be able to:

CO1: Explain the use of digital software in field of design
CO2: Apply essential graphics and visual communication skills in designing
CO3: Create visual poster and edit required images using designing software
CO4: Apply different effects using the vector based software
CO5: Recommend appropriate printing environment for printing a poster

Course Contents

Unit 1(Introduction to the design Software):
Getting to know the workspace, creating and saving documents, using fonts, resizing, rotating and moving documents

Unit 2(Basic Drawing Skills):
Selecting and manipulating objects drawing and shaping objects arranging objects transforming objects outlining & filling objects arranging objects using layers, working with special effects and texts, special effect working with text working with paragraph special text effects using symbols and clipart working with bitmaps

Unit 3 (Working with Objects):
Outlining and filling objects using symbols and clipart transforming objects. Using Text and color Using Text and Color Working with Color Working with Paragraph Text Special Text Effects.

Unit 4 (Adding special effects):
Special effects creating output exporting drawings printing layouts and layers special age layouts arranging objects using layers styles and templates using styles and templates advanced effects special interactive effects custom creation tools working with bitmaps

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Unit5 (Page Layout:):
Printing, Exporting And Advanced Features Special Page Layouts, Exporting Drawings, Using Styles and Templates, Custom Creation Tools

Unit 6 (Case studies and Creating Portfolio): Showcasing most unique and creative work

Course Resources

a. Essential Reading

1. Class Notes
2. Gary David Bouton, (2012) CorelDraw X6 The Official Guide, McGraw-Hill Osborne Media

b. Recommended Reading

1. A Worobiec, T. (2005) Digital Photo Artist: Creative Techniques and Ideas for Digital Image-making, Collins & Brown
2. Rhoda Grossman: Digital Painting Fundamentals with Corel Painter 11

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software: Corel Draw

Course Title	Physical Model Making II
Course Code	VPD009
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare the students to understand the tools, techniques and processes involved in model making. An overview of materials like, Plaster of Paris, sunboard, cardboard and sheet metal used in model making are covered. Students are trained to create form exploration models using basic model making tools and materials.

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe various processes involved in physical model making
CO2 Explain various tools and machines used for model making
CO3 Choose appropriate materials to achieve desired form and finish in a physical model
CO4 Create form exploration models with different materials

Course Contents

Unit 1 – Sheet Metal : Introduction, Sheet metal processing, Sheet metal forming processes - Shearing processes, Finishing processes, Physical Model Making using Sheet metal as medium, Physical Model Making using Aluminium as medium .

Unit 2 Acrylic : Physical Model Making using Acrylic as medium, Model making method and finishing method

Unit 3 : MDF: Physical Model Making using MDF as medium and Finishing technique

Unit 4 Sun Board : Physical Model Making using Sun Board as medium

Unit5 - Polystyrene sheet: Physical Model Making using High Impact Polystyrene Sheet as medium

Course Resources

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a. Essential Reading

1.Class Notes

2.Hallgrimsson, B. (2012) Prototyping and Model making for Product Design, Laurence King Publishers.

b. Recommended Reading

1. Yadav, S.K. (2006) Workshop Practice, Discovery Publishing House.

2. Agostinho, S., Bennett, S., Lockyer, L. and Harper, B. (2011) 'The Future of Learning Design', Learning, Media and Technology

c. Other Electronic Resources

1. Laboratory

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Advanced Diploma Semester 2

Course Title	Banking and Taxation
Course Code	VGE005
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to gain knowledge of the basic principles underlying the substantive provisions of the Income Tax Law and their application in computation of income of an individual under various heads of Income

Course Outcomes

After undergoing this course students will be able to:

CO1: Describe the role and structure of Indian banking system
CO2: Explain functions of commercial banks and its products and role of reserve bank of India
CO3: Identify and comply with the relevant provisions of the Income Tax Act as it relates to the income tax of individuals
CO4: Able to compute income under various heads and tax liability

Course Contents

Unit 1:
Banker and Customer, Paying Banker, Collecting Banker, Types of Customers and Account Holders

Unit 2:
Services to Customers, Principles of Bank Lending, structure of Indian Banking System, Role of Reserve Bank of India, Monetary Policy

Unit 3:
Income Tax Act, 1961, Tax Planning and Management-1
Compute the income under head " income from salaries", "Income from house property" "Income from Business and Profession"

Unit 4: Indirect Taxes and Issues

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Course Resources

a. Essential Reading

1. Class Notes
2. Principles of Income Tax Law & Practice (Assessment Year 2020-21) – By Dr. Naveen Mittal – Published by Cengage Learning India Pvt. Ltd.

b. Recommended Reading

1. Gaur and Narang, Income Tax Law and Practice, Kalyani Publishers,Ludhiana
2. www.incometaxindia.gov.in

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Course Title	Business Communication
Course Code	VGE013
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to deals with essentials of Business Communication and Presentation skills. Students will be equipped with writing skills. Students will be trained to prepare and deliver
formal presentations.

Course Outcomes

After undergoing this course students will be able to:

CO1: Explain the process of communication
CO2: Apply the steps involved in communication
CO3: Compose correct sentences according to the context
CO4: Devise precise paragraphs for effective message transmission

Course Contents

Unit 1: Introduction about importance of communication, Ice breaking session, Practice / Language Lab, Recap of important grammar exercise, Letter writing requirements, Teaching of British style of letter writing, Practice / Language Lab

Unit 2: American style, Application letter, Interview letter, Sales letter, Practice / Language Lab, Enquiry letter, Letter of recommendation, Practice / Language Lab

Unit 3: Short story writing, Practice / Language Lab, Developing Short story when outline is given, Developing articles from caption, Precis writing, Note taking Practice, Practice / Language Lab

Unit 4: Use of proverbs, Practice / Language Lab, Use of idioms, Dialogue writing, Barriers to communication, Practice / Language Lab

Unit 5 : Importance of effective listening, Importance of interpersonal relationship, How to face , Importance of body language interview, How to participate in GD, Practice / Language Lab, Mock Interview, Presentation skills

Course Resources

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a. Essential Reading

1.Class Notes
2. Hory Sankar Mukerjee,(2013),Business Communication, Oxford University Press
3. Kavita Tyagi and Padma Misra, (2011), Professional Communication, PHI, New Delhi

b. Recommended Reading

1. Norman Lewis (2014), Word Power Made Easy, W R Goyal Publishers, New Delhi
2.Collins, (2012), Quick Cross Word, Puzzler Media, UK
3. George Yule, (2008), Oxford Practice Grammar, Oxford University Press, New York

Course Title	Materials for product development
Course Code	VGE049
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare the students to impart knowledge of various materials used for product development. Students are taught about materials such as metals, polymers, composites and eco materials along with their properties and applications. Students are taught to select and propose appropriate materials based on the design requirement.

Course Outcomes

After undergoing this course students will be able to:

CO-1. Describe materials used in product development
CO-2. Explain properties and application of polymer materials used in a product development
CO-3. Discuss various industrial applications of composite materials
CO-4. Identify materials for appropriate industrial applications

Course Contents

Unit 1 - Metals: Metals & Alloys - Ferrous Metals, Nonferrous Alloys, Applications - Alloy Steels, Steels, Stainless Steel. Non Ferrous Metals & Alloys - Aluminum and its alloys, Copper and its alloys, Magnesium, Zinc, Lead, Tin, Titanium, Nickel. Application. Precious Metals. Properties and applications

Unit 2 Introduction to types of polymers : Thermoplastics: Acetals, Acrylics - PMMA, Acrylonitrile-Butadiene-Styrene - ABS, Cellulosics, Fluoropolymers - PTFE , Teflon, Polyamides (PA) - Nylons, Kevlar, Polysters - PET, Polyethylene (PE) - HDPE, LDPE, Polypropylene (PP), Polystyrene (PS), Polyvinyl chloride (PVC). Properties and Applications.

Unit 3 : Thermosets: Amino resins, Epoxies, Phenolics, Polyesters (Unsaturated Polyesters: FRP), Polyurethanes, Silicones. Properties and Applications. Elastomers: Natural rubber, Synthetic rubbers - butadiene rubber, butyl rubber, chloroprene rubber, ethylenepropylene rubber, isoprene rubber, nitrile rubber, polyuSpace: Linear

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Unit 4 ECO materials: Bamboo, Wood and Fibers

Unit 5 Composites: Type of Composites - Metal Matrix Composites,Types of Reinforcement Materials for Polymer Composites, Applications of polymer matrix composites, Glass fibres Forms of glass fibres, FRP Properties & Uses, FRP applications. Carbon and graphite fibres, Aramid fibres, Common polymeric materials

Unit 6 : Using FRP developing of product- demo
Selection of materials – Design criteria for selection of materials
CES Software Demonstration

Course Resources

a. Essential Reading

1. Class Notes
2. Ashby, M. and Johnson, K. (2009) Materials and Design: The Art and Science of material Selection in Product Design, 2nd revised edn, Butterworth- Heinemann Ltd

b. Recommended Reading

1.Karana, E., Pedgley, O., Rognoli, V (2013) Materials Experience: Fundamentals of Materials and Design, Butterworth-Heinemann Ltd
2.Lesko, J. (2008) Industrial Design: Materials and Manufacturing Guide, 2nd edn, John Wiley & Sons
3. Gibson, R. (2007) Principles of Composite Material Mechanics, 2nd edn, CRC Press

c. Other Electronic Resources

1. Laboratory
2. Hardware: Personal Computer
3. Software : materials Cambridge Educational Software

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Course Title	3D Surface Modelling-1
Course Code	VPD010
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course is intended to prepare students to convert 2D sketches into digital 3D surface models. Students are taught about generation of geometric curves, surface modelling and editing techniques. Students are also trained to implement surface modeling techniques

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain the application of computer graphics for visualizing concepts
CO2 Describe modeling techniques and editing methods for surface generation
CO3 Apply modeling techniques to create curves and surfaces
CO4 Analyze created curves and surfaces to achieve realistic model

Course Contents

Unit 1 – Introduction to surface modelling: application of computer graphics for visualizing concepts. Basics of curve and surface based modelling, Software used in industrial product design, Basic terms used in geometric modelling, graphics tablet and uses while developing concepts

Unit 2 Introduction to Surface modelling , advantages and Disadvantages , types point used in Autodesk Alias, curves and surfaces Geometrical curves: Representation of curves, Cubic Spline, Bezier curves, Bspline Curve, Nurbs Curve, Curve , Manipulation, Evaluating points on curves, Blending, Segmentation, Trimming, Intersection, Transformations and Curvature Analysis.

Unit 3 : Create basic surface like sphere, cylinder, cone, torus, cube and plane and practice, Create planer, revolved, extruded, skin surfaces, Cut, Copy, and Paste and practice, Create surface fillets, freeform blend surfaces, profile blend surfaces create a simple model

Unit 4 Generate curves-on-surface, Trim surfaces, Create round surfaces, Duplicate objects, Mirror objects, Group and ungroup objects, Align objects, Create bevel surfaces, Create fillet flange surfaces, Create tube flange surfaces, Create tubular offset surfaces, Create tube surfaces, Exercise on primitives – Create a model

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Unit5 - Create n-sided surfaces, use the multi-surface draft tool, Create draft/flange surface, Move CVs and hulls and practice, Duplicate and combine curves, Add fillet between curves, Add points to a curve, Transform a curve, Stretch curves, Break curves, Intersect and detach curves, Rebuild curves, Planarize curves, Section curves, Attach and detach objects, Insert edit points into an object, Extend and offset objects, Reverse the direction of objects, Edit objects, Close and open objects, Attach and edit the comment associated with an object, Edit queries of an object, Edit descriptive iso-parametric curves, Create a model - Exercise

Unit 6 Dynamic modelling, Change a model dynamically by using the Lattice Rig tool, Transformer Rig tool, Use the Twist Rig tool, Use the Bend Rig tool, Use the Conform Rig tool - Exercise, Work with shells, Stitch and unstitch shells, Apply Boolean operation on shells- Annotate model, Modify or edit a locator, Measure dimensions, Measure deviations, Determine curvature of a curve - Exercise

Unit 7: Import the simple product images and create a surface, Renderers used in Autodesk Autodesk Alias Studio, Apply shaders, textures, lights, and camera to the scene, Use the Multi-lister window, Import the product images and create a surface , practice

Course Resources

a. Essential Reading

1.Class Notes

2. Plastock, Roy A and Kalley, Gordon, Theory and Problems of Computer Graphics, McGraw Hil

b. Recommended Reading

1. Karen E. Goulekas, (2001) Visual effects in a Digital World; Morgan Kaufmann

c. Other Electronic Resources

1. Laboratory
2. Software: Autodesk Alias

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Course Title	Model Machining Process
Course Code	VPD011
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course intends to prepare students to propose machining process under manufacturing processes of part or products to meet design requirements. Students are taught all machining manufacturing processes for metals. Student are taught under joining process with parts assembly with permanent (Welding, Riveting, Soldering and Gluing) or temporary (Mechanical Fastening, Snap fits and locking features) assembly types. Students are also taught part finishing techniques under secondary and tertiary manufacturing process (Deburring, Degating, Powder coating, sand blasting and chrome and zinc plating).

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe materials and their suitability to meet the machinability requirement
CO2 Identify appropriate machining process for various metals
CO3 Explain various types of machining techniques for metallic materials
CO4 Compare different machining processes applicable for a given material
CO5 Relate appropriate processes and suitable materials for machining process a specified part/product

Course Contents

Unit 1(Machining): Machining: Turning – introduction and practice, Machining: Milling- introduction and practice, Machining: Drilling- introduction and practice, Machining: Boring- introduction and practice Machining: Shaping- introduction and practice, Machining: Broaching- introduction and practice and Machining: Grinding- introduction and practice.

Unit 2(Joining): Joining: Welding- introduction and practice, Joining: Brazing- introduction and practice and Joining: Soldering- introduction and practice.

Unit 3 (Finishing): Finishing: Lapping- introduction and practice, Finishing: Polishing- introduction and practice, Finishing: Deburring- introduction and practice, Finishing: Surface treating- introduction and practice, Finishing: coating- introduction and practice and Powder Coating, Other: Etching, Texturing.

Unit 4 (Assembly): Fasteners: Sewing, Rivets, Fasteners: Staples, Fasteners: Threaded Fasteners, Fasteners: Snap Fits, Welding: Hot Gas Welding, Welding: Hot Bar Welding, Welding: Power-

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beam Welding, Brazing Soldering, Torch Welding, Joining Profiles: Hot Plate Welding, Ultrasonic Welding, MIG Welding, TIG Welding, Resistance Welding and Friction Welding, Diffusion and Glaze Bonding

Course Resources

a. Essential Reading

1. Class Notes
2. Lefteri, C. (2012) Making It: Manufacturing Techniques for Product Design, 2nd edn, Laurence King Publishing
3. Angelos P. Markopoulos, J. Paulo Davim (2017), Advanced Machining Processes: Innovative Modeling Techniques (Manufacturing Design and Technology)
4. Hassan Abdel-Gawad El-Hofy (2013), Fundamentals of Machining Processes: Conventional and Nonconventional Processes, Second Edition
5. Andrew Y. C. Nee (2014), Handbook of Manufacturing Engineering and Technology

b. Recommended Reading

1. Lesko, J. (2008) Industrial Design: Materials and Manufacturing Guide, 2nd edn, John Wiley & Sons
2. Mazumdar, S. (2001) Composites Manufacturing: Materials, Product, and Process Engineering, CRC Press
3. Bryce, D. (1998) Plastic Injection Molding: Material Selection and Product Design

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software

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Course Title	Physical Model Detailing and surface Finishing
Course Code	VPD012
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course aims to impart knowledge on the practical aspects of working with different materials,
skills and techniques, design, tools and finishing methods, the students to learn about the need for mock-up and prototype models in the development of an idea or concept. . The students also learn to create physical model and visualize the product

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe various processes involved in physical model making
CO2 Explain various tools and finishing technique methods
CO3 Choose appropriate materials to achieve desired form and finish in a physical model
CO4 Create form exploration and finishing technique and product visualize

Course Contents

Unit 1 Introduction to Physical Model Detailing , Physical Model Making using appropriate material, Intricate detailing of products,

Unit 2 Primary surface finishing (Putty Application)- Introduction, and Practice

Unit 3 Polishing, Surface finishing- introduction to Surface finishing, Masking techniques, Masking process, Practice

Unit 4 Introduction of Painting , Different types of paintings, painting process, Painting working techniques, Color selection, Final Coat painting, Prqactice

Unit5 Graphics design, Reform of the graphic design, Final visualization of Product, Practice

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Course Resources

a. Essential Reading

1.Class Notes

2.Hallgrimsson, B. (2012) Prototyping and Model making for Product Design, Laurence King Publishers.

b. Recommended Reading

1. Yadav, S.K. (2006) Workshop Practice, Discovery Publishing House.

2. Agostinho, S., Bennett, S., Lockyer, L. and Harper, B. (2011) 'The Future of Learning Design', Learning, Media and Technology

c. Other Electronic Resources

1. Laboratory

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Degree

Semester 1

Course Title	Principle Management
Course Code	VGE059
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Unit 1(Introduction to Management Course Summary

The aim of the course is to provide an overview of management and its evolution. It examines management functions of planning, organizing, staffing, leading, directing and controlling and its impact on the business organization. It discusses necessary skills and functions required for efficient manager in contemporary business environment.

Course Outcomes

After undergoing this course students will be able to:

CO1: Describe the primary functions of management and roles of managers
CO2: Explain how managers align the planning process with company vision and mission
CO3: Identify common organizational structures and describe staffing process
CO4: Explain the importance of directing and need for control within the organization

Course Contents

Unit 1 :Management - Introduction, Concept, Meaning and Definition of Management, Characteristics and Importance of Management, Difference between Administration and Management, Process and significance of management, Functions of Management, Managerial roles (Mintzberg), Roles and Functions of a Manager, Levels of Management, Development of Scientific Management and other Schools of thought and approaches, Objectives of Management, Principles of Management.
Case study on Basics of Management and Analysis - I
Case study on Basics of Management and Analysis - II

Unit 2(Planning): Planning; Introduction, Meaning, Importance, Characteristics, Elements of good planning, Types of Planning – Objectives and policies, , Planning Process (steps), Benefits of Planning, Limitations of Planning, Requisites of making effective Planning, SWOT Analysis, Strategic planning and Operational planning, Introduction to Management by objective, Management by objectives; Corporate planning; Environment analysis and diagnosis; Strategy formulation
Case Study on Planning – I
Case Study on Planning – II

Unit 3 (Types of Decisions): Nature, type, importance, principles and techniques of Decision making, Problems involved in Decision making
Case study and Analysis on Decision-Making - I

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Decision making and its process, Objectives and policies- Decision making
Case study and Analysis on Decision Making - II

Unit 4 (Organisation): Introduction, Meaning, Definition, Functions of Organization, Importance, Principles of Organisation, Organization design, Types of Organization (functional, project, matrix and network), Types of authority: Line, staff and functional authority Power - The sources of power - Difference between Authority and power, Delegation - Advantages of Delegation, Barriers to Delegation, Guidelines for Effective Delegation , Decentralization v/s Centralization, Advantages and Disadvantages of Decentralisation, Responsibility, Organisation Structure - Span of Control, Committees, Departmentalisation, Formal and informal organization , Authority and Responsibility, Definition and Types of Responsibility and Accountability, Organization chart
Case Study and Analysis on Organisation - I
Case Study and Analysis on Organisation - II

Unit5 (Staffing): Introduction, Definition, Functions of staffing, Recruitment, Sources of recruitment, Stages of selection procedure, Training, Methods of training and performance appraisal, Factors affecting staffing, job design, Teamwork, Stages of Team Building
Case study and Analysis on Staffing - I
Case study and Analysis on Staffing – II

Unit 6 (Communication)
Significance, Channels of communication, types and process of communication
Communication - barriers and remedies, Effective communication
Case study and Analysis on Communication - I
Case study and Analysis on Communication - II

Unit 7 (Leadership):Functions, qualities, Leadership-Concept and leadership styles ,Leadership –Functions and Types – X, Y and Z Theories, Qualities and Traits of a good Leader, Coordination and Cooperation, concept, significance, principles of coordination, Techniques, obstacles in co-ordination
Case study and Analysis on Coordination - I
Case study and Analysis on Coordination – II

Unit 8 – (Direction):
Concept, nature, importance and principles of Direction
Written vs. Oral Directives. Techniques of Direction
Case study and Analysis on Direction - I
Case study and Analysis on Direction – II

Unit 9: (Control): Definition of Controlling - Meaning and Importance of controlling, Relationship between Planning and Controlling, Control Process - Characteristics of Good control System. Types of Control, Barriers to control making and how to overcome

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them, Control techniques, budget and non-budgetary control devices, Introduction to TQM Budgetary Control, Management Audit. Management Audit, Components of Management Audit
Case study and Analysis on Control
Case study and Analysis on Budgeting - I
Case study and Analysis on Budgeting - II

Course Resources

a. Essential Reading

1. Class Notes
2. Harold Koontz, O'Donnell and Heinz Weihrich, 2012. Essentials of Management. New Delhi, 9th edition, Tata McGraw Hill

b. Recommended Reading

1. Stephen P. Robbins, David A. Decenzo, 2016. Fundamentals of Management, Pearson Education, 9th Edition
2. Management Fundamentals: Concepts, Applications, & Skill Development, 6th edition, Sage. 2014

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Course Title	Cost Estimation and Project management
Course Code	VGE069
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to students will be able to demonstrate practical knowledge of the functional areas of business,be able to integrate current technology in support of business operations. To demonstrate collaboration for effective leadership and decision making to develop strategies to initiate, plan, execute, monitor and control, and close projects in business environments.

Course Outcomes

After undergoing this course students will be able to:

- CO1: Understand how estimating methods are used , to apply risk analysis to cost estimating. The estimating process of life-cycle costs and how estimating tools are applied
- CO2: To demonstrate practical knowledge of the functional areas of business
- CO3: To demonstrate highly developed communication skills,evaluate complex financial and operational data and information for decision making
- CO4: To evaluate strategic objectives that enhance organizational effectiveness and operational performance

Course Contents

Unit 1(Introduction to Cost Estimation): Introduction to Cost Estimation, Importance of Costing and Estimation, Methods of costing elements of cost estimation, Types of estimates, estimating procedure, estimation labor cost, Allocation overhead charges, calculation of depreciation cost.

Unit 2(Cost Estimation): Cost components, cost structures, markup and profit, Importance of machining time calculation, calculation of machining time for different lathe operations , drilling, boring, milling, grinding.

Unit 3 (Introduction to project management): introduction to project management, need for project management, project management knowledge areas and processes Project lifecycle, Phases of project management life cycle, Project Manager, Impact of delays in

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project competitions, Essentials of project management philosophy, Project Identification process

Unit 4 (Feasibility studies): Project Initiation, prefeasibility study, Feasibility studies, Project planning, project breakeven point, Work Breakdown Structure (WBS), Project Leader, relationship between project manager and line manager, Development of project network, CPM model, Network cost System

Unit 5 (Scheduling and Risk management): Introduction, resource allocation, scheduling, risk management, role of risk management in overall management, steps in risk management, risk identification, risk analysis, reducing risks

Unit 6 (value Engineering): Basic concepts of value engineering, Value engineering cycle, Value engineering job plan, Types of product functions, Applications

Course Resources

a. Essential Reading

1. Class Notes
2. PROCESS PLANNING AND COST ESTIMATION,PANNEERSELVAM, R. , SIVASANKARAN, P.,PHI Learning Pvt. Ltd., 2016
3. ESTIMATION AND COSTING,BY B.N. DUTTA
4. The Art of Project management,by Scott Berkun
5. Fundamentals of Project Management by Joseph Heagney

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Course Title	Mechanism for Product design
Course Code	VGE070
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare students to deals with mechanisms and their application for product development. The students are taught about linkages, wedges, cam, followers and gears. Students are trained to analyze existing mechanisms used in products and propose new variants. They are also trained to construction of digital and physical model of the proposed mechanism.

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe simple mechanisms and underlying principles
CO2 Classify mechanisms and identify their applications
CO3 Propose mechanisms for products to achieve desired functionality
CO4 Demonstrate the working principles through digital and physical model

Course Contents

Unit 1 Introduction: Applications of mechanisms in product design to Consumer products, Consumer durables, transportation Design, Construction equipment.

Unit 2 Introduction to kinematics and planar mechanisms: four-bar chain; four-bar chain inversions; slider crank chain; slider crank chain inversions; double slider crank chain; double slider crank chain inversions; Quick return motion mechanisms; Straight line motion mechanisms; Intermittent Motion mechanisms; Toggle mechanism

Unit 3 : Mechanisms and their applications: Levers, Wedges, Linkages with simple calculations

Unit 4 : Cam and followers: Introduction to Cams; Classification of followers; Classification of Cams; Cam nomenclature; Motion of the Follower; Displacement, Velocity and acceleration diagrams. Simple Harmonic Motion, Uniform acceleration and retardation, cycloidal motion; construction of CAM profiles; Cams with specified contours, reciprocating roller follower and flat faced follower.

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Unit5: Power transmission Gear Drive: Ordinary and planetary gear trains gearing fundamentals: conjugate action, contact ratio and tooth systems with calculations

Unit 6: Simple mechanism: Analyze simple physical mechanisms used in toys, mechanisms of electro – mechanical components to understand the functions and generate new variants of mechanisms, construct simple digital and physical model.

Course Resources

a. Essential Reading

- Class Notes

b. Recommended Reading

1. Wilson, C. E. and Sadler, J. P. (2003) Kinematics and Dynamics of Machinery, 3rd edn, Prentice Hall

c. Other Electronic Resources

1. Laboratory
2. Hardware: Personal Computer
3. Software : Catia

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Course Title	Design Essentials
Course Code	VPD013
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of this course is to enable students to understand the design process and different stages of product design cycle and life cycle of a product. The students are taught to prepare a design boards and gestalt principles and concept generation techniques using brainstorming, mind mapping, gallery method and other concept generation techniques. Students are taught with product case studies to make them understand the essential design and design features requirements in a product. Student are enable to develop a new concepts with manual sketching using hand tools and later on it will be converted in digital detail design and rendering real material for better visualization before to go for product development.

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain the design process and stages of product design cycle and product life cycle
CO2 Discus the concept generation techniques
CO3 Apply the gestalt principles and elements of design to develop digital design
CO4 Create product concepts using hand tools and digital tools

Course Contents

Unit 1(Introduction): Introduction to Design Process, Different stages of product design cycle, Life cycle of a product, Explanation and preparation of Image board, Lifestyle board, Mood board, theme board.

Unit 2(Gestalt Principles): Nine influential Principles of Gestalt (Application in design) -1, Nine influential Principles of Gestalt (Application in design) -2, Nine influential Principles of Gestalt (Application in design) -3 (Figure and Ground, Similarity, Proximity, Continuity, Closure, Focal point, Symmetry, Common Region and Common Fate)

Unit 3 (Concept Generation): Introduction a Concept generation techniques, Concept generation techniques with Gallery Method, mind-mapping and other available techniques. Design Case: Art Lebedev Studio, Russia

Unit 4 (Product Usability): Introduction to Product Usability, Product Usability – Exercise 1. a (Hand Tools), Product Usability – Exercise 1. b (Hand Tools), Product Usability – Exercise 2. a (Hand held Electronic products), Product Usability – Exercise 2. b (Hand held Electronic products), Product Usability – Exercise 3. a (Consumer electronic Goods), Product Usability – Exercise 3. b (Consumer electronic Goods), Design Case: Waalmakers, the Netherlands and Design Case: WAACS Design, the Netherlands.

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Unit5 (Ideation and visualization of the product): Introduction to Ideation and visualization of the product, Creating Products from Basic shapes, Sketching Consumer Products 1, Sketching Consumer Products 2, Sketching Consumer Products 3, Product concepts and detail design 1, Product concepts and detail design 2, Product Presentation 1 and Product Presentation 2.

Course Resources

a. Essential Reading

1. Class Notes
2. Laura Slack (2006), What is Product Design? Essential design handbook.
3. Rajesh Lal (2013), Digital Design Essentials, 100 ways to design better desktop, web, and mobile interfaces.
4. Wolfgang Kohler (1970), Gestalt Psychology, The Definitive Statement of the Gestalt Theory
5. Koos Eissen, Roselien Steur (2019), Sketching (paperback): Drawing Techniques for Product Designers

b. Recommended Reading

1. Bhagvanji Sonagra, Sushmita Rao and Bhavin Dabhi (2020), Nature of Form (For Designers), Metaphorical Forms.
2. Website: Sketch a Day

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software

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Course Title	3D Surface Modelling II
Course Code	VPD014
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

This course is intended to prepare students to convert 2D sketches into digital 3D surface models. Students are taught about generation of geometric curves, surface modelling and editing techniques. Students are also trained to implement advance surface modeling techniques

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain the application of computer graphics for visualizing concepts
CO2 Describe modeling techniques and editing methods for surface generation
CO3 Apply modeling techniques to create curves and surfaces
CO4 Analyse created curves and surfaces to achieve realistic model

Course Contents

Unit 1 – Introduction to Surface modelling , advantages and disadvantages, types point used in Autodesk Alias, curves and surfaces, Introduction to Autodesk Alias tool, Autodesk Alias Studio view windows and workflows, Types of curves and key point curves, Edit key-point curves and practice, Evaluate curve and surface continuity, Create parting lines, Evaluate minimum and maximum curvatures, Check models for data transfer, Evaluate deviations, layers, and color schemes in Autodesk Autodesk Alias Studio

Unit 2 Introduction to Class A modelling , advantages and disadvantages, Class A surface modeling: Importance of Class A surface modeling, Geometric and Parametric Continuity, Positional Continuity, Tangent Continuity, Curvature Continuity and Surface Evaluation, Presenting Design concepts: Rendering Introduction, Hardware Shade Light Settings, Hardware Shade, Environment Effects, Environments, Creating Image Files, Bookmarks

Unit 3 : Surface building methods: Introduction to reverse engineering (RE), cloud points data,3D scanning, treatment of digital scanned data, Exchange high-quality CAD translators for industry standard data formats such as DXF, IGES, and STEP files, Import the sketches(form generation) and create a surface, Creation of Layers - Create a product model - Exercise

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Unit 4 Patch / Surface Parameterization, Golden rules of Autodesk Alias, Analyzing diagnostic shade and Visualization options on created surface, Creating preference set for rapid modelling, Import the sketches and create a surface

Course Resources

a. Essential Reading

1.Class Notes

2. Plastock, Roy A and Kalley, Gordon, Theory and Problems of Computer Graphics, McGraw Hil

b. Recommended Reading

1. Karen E. Goulekas, (2001) Visual effects in a Digital World; Morgan Kaufmann

c. Other Electronic Resources

1. Laboratory
2. Software: Autodesk Alias

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Course Title	Group Project -1
Course Code	VPD015
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare students to impart the emphasizes the need and relevance of a structured approach to identify and undertake a research topic. This course provides an opportunity for students to apply theories and techniques from the courses taught previously. In case of sponsored projects, the students will be required to carry out the project work in respective companies.

Course Outcomes

After undergoing this course students will be able to:

CO1 Identify the need for developing a new or improving an existing product or system through an organized survey of literature
CO2 Design and model the product or system to meet the design specifications
CO3 Evaluate and justify the performance of the modelled system
CO4 Demonstrate the working of the product or system and make a presentation
CO5 Write a technical report

Course Contents

Collection of relevant literature and review of literature
Interaction with the users and collection of data
Data Analysis, Formulation of a problem of suitable size
Writing down the design specifications
concept generation and concept selection
Detail design calculations
Choosing a modelling environment, learning the appropriate tools and techniques
Modelling, simulation and analysis of design
Defining performance parameters, Evaluation of performance, presentation of performance characteristics,
Verification of results
Demonstration to the defined audience and making a presentation to the assessing team

Course Resources

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a. Essential Reading

The Methodology to be followed for successful Completion of Project work

b. Recommended Reading

1. Course Notes, Manuals of Tools and Techniques Chosen to Solve the Design Problem

c. Other Electronic Resources

1. Laboratory
2. Hardware
3. Software

Degree

Semester 2

Course Title	Labour laws, Occupational health and safety
Course Code	VGE047
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

India introduced the Minimum Wages Act in 1948, giving both the Central government and State government jurisdiction in fixing wages. The act is legally non-binding, but statutory. Payment of wages below the minimum wage rate amounts to forced labour. The main purpose of the Act is to protect workers from health and safety hazards on the job. It sets out duties for all workplace parties and rights for workers. It establishes procedures for dealing with workplace hazards and provides for enforcement of the law where compliance has not been achieved voluntarily.

Course Outcomes

After undergoing this course students will be able to:
CO1: knowing about labour laws, Occupational health and safety
CO2: knowing about Key principles and aim of occupational health and safety (OHS) programs
CO3: Learning about governments enact labour laws on industrial relations and rights of labour.
CO4: able to explain about economic and social justice to workforce in any organization.

Course Contents

UNIT 1 (Labour laws) : Introduction to labour laws, occupational health and safety, Constitutional rights, Contract and rights, Scope of protection, Employment contracts, Wage regulation, Working time, Health and safety, Pensions and insurance, Workplace participation, Trade unions, Management participation, Collective action, Sex discrimination, Migrant workers, Vulnerable groups, Dismissal regulation, International comparison of Indian labour laws.

UNIT 2 (Occupational Safety and Health, Safety): occupational Safety and Health, Safety Legislation, Workers Compensation and Recordkeeping, Safety Related Business Law, Accident Causation and Investigation, Introduction to Industrial Hygiene, Ergonomics and safety management, Fire Prevention and Protection, System Safety. Managing the safety function, Psychology and safety, Workplace Violence, Terrorism Preparedness, Hazardous materials, Transportation Safety, Required written programs, Resources on safety and health, working at different weather, Indian Scenario, Health and Safety Concerns across Sectors in India.

Course Resources

a. Essential Reading

1. Class Notes

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2. Reference from "Kahn-Freund's LABOUR AND THE LAW by Paul Davies, M.A., LL.M Fellow of Balliol College, Oxford; Lecturer in Law at the University of Oxford Mark Freedland, LL.B., M.A., D. Phil., of Gray's Inn, Barrister; Fellow of St. John's College, Oxford. University Lecturer in Labour Law at the University of Oxford.

b. Recommended Reading

1. The fundamental principles of occupational health and safety second edition benjamin o. alli o. alli, international labour office -geneva.

c. Other Resources

1. http:// https://ecu.au.libguides.com/c.php?g=410557&p=6665306
2. https://labour.gov.in/e-book-1

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Course Title	Entrepreneurship development
Course Code	VGE068
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course are to familiarize students with various concepts used in understanding processes involved in entrepreneurship and business formation and development. Provide context to those processes in the form of differences between small and large firms, and the economic environment. This course provides the students with an in-depth understanding of key concepts in entrepreneurship and business development. It will cover the different types of entrepreneur here – social, serial and lifestyle. The course addresses the theories and techniques applied to business development - new business formation (measuring start-up activity, new entrepreneurs and social networks), business growth and sustainability. Students learn about finance and small business and development strategies designed to develop business and businesses.

Course Outcomes

After undergoing this course students will be able to:

CO1 Define entrepreneur and entrepreneurship
CO2 Identify essential qualities' of entrepreneurship
CO3 Analyze the business environment in order to identify business opportunities
CO4 Identify the elements of success of entrepreneurial ventures
CO5 Evaluate the effectiveness of different entrepreneurial strategies
CO6 Interpret their own business plan

Course Contents

Unit 1: Introduction to Entrepreneurship, Types of Entrepreneurs, Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth, Major Motives Influencing an Entrepreneur, Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test and Stress Management, Entrepreneurship Development Programs.

Unit 2: Small Enterprises – Definition, Classification – Characteristics, Ownership, Classification – Characteristics, Ownership Structures, Steps involved in setting up a Business, Identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment, Preparation of Preliminary Project and Case studies.

Unit 3 : Preparation of Preliminary Project, Reports – Project Appraisal – Sources of Information, Classification of Needs and Agencies, Case studies, Sickness in small Business, Concept, Magnitude, Causes and Consequences, Corrective Measures, Business Incubators, Case studies,

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Government Policy for Small Scale Enterprises, Growth Strategies in small industry, Expansion and Diversification, Joint Venture and Merger and Sub Contracting

Unit 4: Importance of family business, Types - History - Responsibilities and rights of shareholders of a family business, Succession in family business - Pitfalls of the family business, Strategies for improving the capability of family business, Improving family business performance, Importance of international business to the firm, International versus domestic entrepreneurship, Entrepreneurship entry into international business and Exporting - Direct foreign investment - barriers to international trade.

Course Resources

a. Essential Reading

1. Class Notes
2. Bridge, S, O'Neill, K & Cromie, S (2003), Understanding Enterprise, Entrepreneurship and Small Business. Palgrave MacMillan
3. Hisrich R & Peters, M (1995), Entrepreneurship: Starting, Developing, and Managing a New Enterprise, London: Irwin.
4. Lynn G S & Lynn, N (1992), Entrepreneurship: Turning Bright Ideas into Breakthrough Business for Your Company, New York: Probus Publishing

b. Recommended Reading

1. Allen, K (1995), Launching New Ventures: An Entrepreneurial Approach, London: Upstart
2. Bangs, D (1992), The Business Planning Guide: Creating a Plan for Success in Your Own Business, London: Upstart
3. Barrow, C., Burke, G. Molian, D & Brown, R. (2005), Enterprise Development: The Challenges of Starting, Growing and Selling Businesses, London: Thomson
4. Bolton, B & Thompson, J (2003), The Entrepreneur in Focus: achieve your potential, London: Thomson.

c. Other Electronic Resources

1. Laboratory
2. Hardware: PCs
3. Software

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Course Title	Organizational Behavior
Course Code	VGE056
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to provide an overview of concepts, principles, problems, and practices of operations management and how these operations have strategic importance and can provide a competitive advantage in the workplace.

Course Outcomes

After undergoing this course students will be able to:

CO1: Identify the elements of operations management and organization
CO2: Summarize operations scheduling, management of quality, and facilities planning in operations management
CO3. Understand the importance of inventory management, forecasting and supply chain management
CO4: Analyze and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments

Course Contents

Unit 1:
Introduction to Behavior and Components of Behavioral Skills
Understanding the Importance of Behavioral Skills in an Organization, Brief Overview of Subsequent Topics – individual, group, organizational level, Ice-breaker and de-briefing, Dimensions of Individual Behavior : Types of Ability and their significance
Perception – process, factors, perceptual selectivity and organization Perception - perceptual ambiguity, Attribution, Attitudes – formation and change
Learning – approaches (classical conditioning, operant conditioning, social learning) and their application in daily life

Unit 2:
Learning - Shaping of behavior, Behavior Modification
Personality – Determinants, Traits and Types
Personality –The Big Five Model, Holland's Typology
Motivation –motives, drives, incentives
Motivation –early and contemporary approaches to Motivation; applications in daily life
Motivation –early and contemporary approaches to Motivation; applications in daily life (Continued)
Stress Management- Stress and Strain, Work Stress - causes and impact, Coping Strategies.

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Time Management-Time as a resource, Identify important Time Wasters
Time Management- Individual Time Management Styles, Techniques for better Time Management
Emotional Intelligence – concept and applications; EQ, Work Ethics and Commitment
Case Studies, Individual Exercises, Role Plays

Unit 3:

Dimensions of Group Behavior :
Inter-personal Skills – Transactional Analysis
Inter-personal Skills – Transactional Analysis (Individual Exercise)
Inter-personal Skills –Johari Window
Inter-personal Skills –Johari Window (Individual Exercise)
Teamwork – group and team, types, evolution
Teamwork –group size and task, group dynamics – interdependence, cohesiveness
Teamwork –group norms, conformity and deviance; social loafing, impact of effectiveness
Case Studies, Individual and Group Exercises, Role Plays
Dimensions of Organizational Behavior :
Leadership – evolution, approaches, behavioral perspective
Leadership – leader vs. manager; leadership styles – autocratic, democratic, laissez faire
Leadership – leadership styles – transactional, transformational, charismatic
Leadership – across cultures
Power – sources and types, empowerment
Power – moderating political behavior in organizations
Power – ethics in power and politics
Conflict – functional and dysfunctional conflict, sources, types
Conflict –the conflict process
Conflict – management strategies and outcomes
Case Studies, Individual and Group Exercises, Role Plays

Course Resources

a. Essential Reading

2. Class Notes
3. Essentials of Organizational Behavior | Fourteenth Edition | By Pearson Paperback

b. Recommended Reading

1. Essentials of Organizational Behavior by Stephen Robbins and Timothy Judge
2. Organizational Behavior: A Skill-Building Approach by by Dr. Christopher P. Neck, Jeffery D. Houghton, and Emma L. Murray

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Course Title	Work Portfolio
Course Code	VPD016
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course ii enable students with a foundation in graphic design to develop skills to create and present their idea. The students are taught the process of representing images used to communicate ideas through visually. They are also thought the fundamentals of graphic design. The students are trained to prepare portfolio presentations.

Course Outcomes

After undergoing this course students will be able to:

CO1 Describe the process required to develop a portfolio
CO2 Explain the importance of portfolio
CO3 Develop effective and cogent information graphics using digital tools
CO3 CO4 Create visual representations and finished designs for presentation work

Course Contents

Unit 1 Introduction to portfolio, need and advantages of developing portfolio, Different types of portfolio and their brief, Development of Product Design Portfolio- Concept sketches refinement

Unit 2 Development of appearance model and Working Model

Unit 3 Printing techniques- types and need of printing techniques, Printing techniques – demo

Unit 4 Product Photography – introduction, Product photography – demo

Unit 5 Portfolio Presentation techniques
Unit 6 Creating the documents

Course Resources

a. Essential Reading

1. Michael J. (2013), Burn Your Portfolio: Stuff They Don't Teach You in Design School, New Riders

b. Recommended Reading

1. Craig W. (2013), Design/Portfolio: Self Promotion at Its Best, Hachette Book Group
2. Carolyn K. , Jessica G., (2010), The Graphic Design Exercise Book, HOW Books

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Course Title	Reverse Engineering and rapid Prototyping
Course Code	VPD017
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is enable students understand the Reverse Engineering (RE) has become an important Engineering task to obtain knowledge about engineering device or system. RE is an effective learning technique and understand reverse engineering technology helps in the creation of a three-dimensional virtual model and physical model

Course Outcomes

After undergoing this course students will be able to:

CO1 Explain the Reverse Engineering (RE) Methodology
CO2 Understand RE and Rapid Prototyping Technology
CO3 Apply RE applications in consumer and automotive products
CO4 Design and development of virtual model and physical model using RP software

Course Contents

Unit 1 Introduction: Need for the time compression in product development, History of RP systems, Survey of applications, Growth of RP industry

Unit 2 Introduction to Rapid Prototyping, need of RP in Product Development, Basic Principles of Generative Manufacturing Processes, Steps in RP: Process chain in RP in integrated CAD-CAM environment, Reverse Engineering: Utility of Rapid Prototyping in Reverse Engineering, Exercise on Reverse engineering – Selection of a product, Exercise on Reverse engineering – disassembly of parts and sub-assemblies

Unit 3 Exercise on Reverse engineering – part modelling, assembly, exterior Modelling, Surface detailing, mechanism modelling

Unit 4 Rapid Prototyping Systems - Stereo Lithography, Selective Laser Sintering, Fusion Deposition Modelling, Solid Ground Curing, Laminated Object Manufacturing, Concepts Modelers, Advantages, disadvantages and applications

Unit 5 Scanning of selected component using Reverse engineering machine, generation of cloud point data and surfacing, conversion to STL file format using suitable software, Identifying process

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parameters of Fused Deposition Modelling and understanding working of FDM machine, post processing operations of finished RP part

Unit 6 Suggestions for improvements in existing design

Course Resources

a. Essential Reading

Reginald Wong (2018) Mastering Reverse Engineering: Re-engineer Your Ethical Hacking Skills

b. Recommended Reading

1. Alexandre Gazet, Bruce Dang, and Elias Bachaalany (2014) Practical Reverse Engineering: X86, X64, ARM, Windows Kernel, Reversing Tools, and Obfuscation

c. Other Electronic Resources

1. Laboratory
2. Hardware: RP machine
3. Software : Catia and Autodesk Alias

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Course Title	Group Project -2
Course Code	VPD018
Department	Industrial Design
Faculty	Faculty of Art and Design (FAD)

Course Summary

The aim of the course is to prepare students to impart the emphasizes the need and relevance of a structured approach to identify and undertake a research topic. This course provides an opportunity for students to apply theories and techniques from the courses taught previously. In case of sponsored projects, the students will be required to carry out the project work in respective companies.

Course Outcomes

After undergoing this course students will be able to:

CO1 Identify the need for developing a new or improving an existing product or system through An organized survey of literature
CO2 Design and model the product or system to meet the design specifications
CO3 Evaluate and justify the performance of the modelled system
CO4 Demonstrate the working of the product or system and make a presentation
CO5 Write a technical report

Course Contents

- Collection of relevant literature and review of literature
- Interaction with the users and collection of data
- Data Analysis, Formulation of a problem of suitable size
- Writing down the design specifications
- concept generation and concept selection
- Detail design calculations
- Choosing a modelling environment, learning the appropriate tools and techniques
- Modelling, simulation and analysis of design
- Defining performance parameters, Evaluation of performance, presentation of performance characteristics,
- Verification of results
- Demonstration to the defined audience and making a presentation to the assessing team

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Course Resources

a. Essential Reading

The Methodology to be followed for successful Completion of Project work

b. Recommended Reading

1. Course Notes, Manuals of Tools and Techniques Chosen to Solve the Design Problem

c. Other Electronic Resources

1. Laboratory
2. Hardware:
3. Software :

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