# I year Curriculum – UG and DD (2014 Batch Onwards)

## B1 BATCH    -        (2014 EDM, MDM,MFD,MPD)

**Semester 1**

| Course No | Course Name | Category | L | T | P | C |
|---|---|---|---|---|---|---|
| MAT104T | Calculus | BSC | 3 | 0 | 0 | 3 |
| PHY107T | Engineering Electromagnetics | BSC | 3 | 0 | 0 | 3 |
| ELE103T | Basic Electrical & Electronics Engineering | BEC | 3 | 0 | 0 | 3 |
| DES101T | Concepts in Engineering Design / | DES | 3 | 0 | 0 | 3 |
| INT107T | English for Communication | HMC | 2 | 0 | 0 | 2 |
| MAN102T | Professional Ethics | HMC | P / F course | | | |
| INT110P | Engineering Skills Practice | BEC | 0 | 0 | 3 | 2 |
| INT111P | Measurement & Data Analysis lab | BEC | 0 | 0 | 3 | 2 |
| PHY107P | Engineering Electromagnetics Practice | BSC | 0 | 0 | 3 | 2 |
| INT109P | Engineering Graphics | BEC | 1 | 0 | 3 | 3 |

**Semester 2**

| Course No | Course Name | Category | L | T | P | C |
|---|---|---|---|---|---|---|
| MAT105T | Differential Equations | BSC | 3 | 0 | 0 | 3 |
| PHY108T | Engineering Mechanics | BSC | 3 | 0 | 0 | 3 |
| INT108T | Science and Engineering of Materials | BEC | 3 | 0 | 0 | 3 |
| COM105T | Computational Engineering / | BEC | 3 | 0 | 0 | 3 |
| DES102T | Design History | DES | 2 | 0 | 0 | 2 |
| DES103T | Earth, Environment & Design | DES | 2 | 0 | 0 | 2 |
| PHY109P | Basic Materials & Mechanics Practice | BSC | 0 | 0 | 3 | 2 |
| COM105P | Computational Engineering Lab | BEC | 0 | 0 | 3 | 2 |
| DES104P | Industrial Design Sketching | DES | 0 | 0 | 3 | 2 |
| DES105P | Design Realization | DES | 0 | 0 | 3 | 2 |

# I year Curriculum – UG and DD (2014 Batch Onwards)

## B2 BATCH    -        (2014 COE,CED,EVD,ESD)

**Semester 1**

| Course No | Course Name | Category | L | T | P | C |
|---|---|---|---|---|---|---|
| MAT104T | Calculus | BSC | 3 | 0 | 0 | 3 |
| PHY107T | Engineering Electromagnetics | BSC | 3 | 0 | 0 | 3 |
| COM105T | Computational Engineering | BEC | 3 | 0 | 0 | 3 |
| INT108T | Science and Engineering of Materials | BEC | 3 | 0 | 0 | 3 |
| INT107T | English for Communication | HMC | 2 | 0 | 0 | 2 |
| DES103T | Earth, Environment & Design | DES | 2 | 0 | 0 | 2 |
| INT110P | Engineering Skills Practice | BEC | 0 | 0 | 3 | 2 |
| COM105P | Computational Engineering Lab | BEC | 0 | 0 | 3 | 2 |
| PHY107P | Engineering Electromagnetics Practice | BSC | 0 | 0 | 3 | 2 |
| INT109P | Engineering Graphics | BEC | 1 | 0 | 3 | 3 |

**Semester 2**

| Course No | Course Name | Category | L | T | P | C |
|---|---|---|---|---|---|---|
| MAT105T | Differential Equations | BSC | 3 | 0 | 0 | 3 |
| PHY108T | Engineering Mechanics | BSC | 3 | 0 | 0 | 3 |
| DES101T | Concepts in Engineering Design | DES | 3 | 0 | 0 | 3 |
| ELE103T | Basic Electrical & Electronics Engineering | BEC | 3 | 0 | 0 | 3 |
| DES102T | Design History | DES | 2 | 0 | 0 | 2 |
| MAN102T | Professional Ethics | HMC | P / F course | | | |
| PHY109P | Basic Materials & Mechanics Practice | BSC | 0 | 0 | 3 | 2 |
| INT111P | Measurement & Data Analysis lab | BEC | 0 | 0 | 3 | 2 |
| DES104P | Industrial Design Sketching | DES | 0 | 0 | 3 | 2 |
| DES105P | Design Realization | DES | 0 | 0 | 3 | 2 |

**MAT104T    -    Calculus**

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|---|---|
| Contents of the course | Limit and Continuity of functions defined on intervals, Intermediate Value Theorem, Differentiability, Rolle's Theorem, Mean Value Theorem, Taylor's Formula (5) <br> Sequences and series   (7) <br> Definite integral as the limit of sum – Mean value theorem – Fundamental theorem of integral calculus and its applications (9) <br> Functions of several variables – Limit and Continuity, Geometric representation of partial and total increments Partial derivatives – Derivatives of composite functions   (8) <br> Directional derivatives – Gradient,  Lagrangemultipliers – Optimization problems (7) <br> Multiple integrals – Evaluation of line and surface integrals (6) |
| Textbook | Thomas. G.B, and Finney R.L, Calculus, Pearson Education, 2007. |
| References | 1.  Piskunov. N, Differential and Integral Calculus, Vol. I & II, Mir. Publishers, 1981. <br> 2.  Kreyszig. E, Advanced Engineering Mathematics, Wiley Eastern 2007. <br> 3.  J Hass, M D Weir, F R Giordano, Thomas Calculus, 11th Edition, Pearson. |

# PHY107T   -   Engineering Electromagnetics

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|---|---|
| Contents of the course | Vectors - an introduction;  Unit vectors in spherical and cylindrical  polar  co-ordinates; Concept  of  vector  fields;  Gradient  of  a  scalar  field; flux, divergence of a vector, Gauss's theorem,  Continuity equation; Curl – rotational and irrotational  vector fields, Stoke's theorem.            (12)<br><br>Electrostatics:<br>Electrostatic potential and field due to discrete and continuous charge distributions, boundary condition, Energy for a charge distribution, Conductors and capacitors, Laplaces equation  Image  problem , Dielectric polarization, electric displacement vector, dielectric susceptibility , energy in dielectric systems.<br>(10)<br><br>Magnetostatics:<br>Lorentz Force law Biot-Savart's law  and Ampere's law  in magnetostatics, Divergence and curl of B, Magnetic induction due to configurations of  current-carrying  conductors, Magnetization and bound currents,  Energy density in a magnetic field   Magnetic permeability and  susceptibility.<br>(10)<br><br>Electrodynamics:<br>Electromotive force, Time-varying fields, Faradays' law of electromagnetic induction, Self and mutual inductance, displacement current, Maxwell's equations in free space. Boundary condition, propagation in linear medium. Plane  electromagnetic  waves—reflection and  refraction, electromagnetic energy density, Poynting vector.<br>(10) |
| Textbook | 1. W. H. Hayt and J. A. Buck, Engineering Electromagnetics, Tata McFraw Hill Education Pvt. Ltd, 2006. |
| References | 1. Grifiths. D. J, Introduction to Electrodynamics, Prentice Hall, 2007.<br>2. Purcell. E.M, Electricity and Magnetism Berkley Physics Course, V2, Tata McGraw Hill, 2008.<br>3. Feynman. R.P, Leighton. R.B, Sands. M, The Feynman Lectures on Physics,  Narosa Publishing House, Vol. II, 2008. Hill, 2008.<br>4. G. B. Arfken, H. J. Weber and F. E. Harris, Mathematical Methods for Physicists, Academic Press, 2013. |

## COM105T  -  Computational Engineering

| | |
|---|---|
| Contents of the course | Introduction  to  computers & breadth scope in engineering  –  Computer  organization basics  –  Problem  solving strategies –  Higher level languages  – Program design and development –Phases of program development  - Basic programming constructs in C – Data types in C –Input output statements  – Operators, control structures in C - Sequential, Selection, Repetition    (12) Functions in C –Function declaration, definition – Built and user defined functions – Storage classes and scope –Recursive functions – Arrays in C – multidimensional arrays-String manipulations – Library support   (14) Introduction to pointers – References – Pointer Arithmetic  – Formatted input output – User defined data types  – File processing in C - Sequential & Random  -  Dynamic Memory Allocation – Command Line Arguments – Usable CLI based applications - Non linear equations–  Bisection, Newton raphson methods.      (16) |
| Textbook | Deitel P J and Deitel H M, C : How To Program, Prentice Hall, 7$^{th}$ Edn, 2012. |
| References | 1.   Kernighan, Ritchie D, The C Programming Language, Prentice Hall, 2 Edn. 2.   Chapra S.C and Canale R.P, Numerical Methods for Engineers, McGraw Hill, 2006. |

# ELE103T   -   Basic Electrical & Electronics Engineering

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|---|---|
| Contents of the course | Electrical circuit elements: voltage and current sources, R,C,L,M,I,V, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff's laws, Elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual inductance      (7)<br><br>Network analysis: Nodal analysis with independent and dependent sources, modified nodal analysis, mesh analysis,  notion of network graphs, nodes, trees, twigs, links, co-tree, independent sets of branch currents and voltages                    (6)<br><br>Network theorems: voltage shift theorem, zero current theorem, Tellegen's theorem, reciprocity, substitution theorem, Thevenin's and Norton's theorems, pushing  a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer                 (8)<br><br>RC and RL circuits: natural, step and sinusoidal steady state responses, series and parallel RLC circuits, natural, step and sinusoidal steady state responses  (5)<br><br>AC signal measures: complex, apparent, active and reactive power, power factor          (2)<br><br>Introduction to three phase supply: three phase circuits, star-delta transformations, balanced and unbalanced three phase load, power measurement, two wattmeter method             (5)<br><br>Semiconductor diodes and application: PN diodes, rectifiers and filters, clipping and clamping circuits, voltage multiplier circuits                    (5)<br><br>Bipolar Junction Transistors: DC characteristics, CE, CB, CC configurations, biasing, load line      (4) |
| Textbook | 1. Hayt. W. W, Kemmerly. J.E, and Durbin. S.M, Engineering Circuits Analysis, Tata McGraw Hill, 2008.<br>2. Boylestad R. &Nashelsky L., Electronic Devices & Circuit Theory, Pearson Education, 2009 |
| References | 1. Hughes Edward, Electrical & Electronic Technology, Pearson Education, 2007.<br>2. Hambley. A, Electrical Engineering Principles and Applications: International Version,<br>Pearson Education, 4 Edn, 2007.<br>3. Alexander.C. K. & Mathew. N. O. Sadiku, Fundamentals of Electrical circuits, Tata McGraw Hill, 2008. |

## DES101T  -  Concepts in Engineering Design /

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|---|---|
| Contents of the course | Design Conceptualization and Philosophy, Original, Adaptive, Variant and Re-Design, Evolution of Concept, Need for Systematic design Past methods of and design<br><br>Product life cycle, Innovation, Types of innovation<br><br>Needs and opportunities, Vision and Mission of a concept, Type of needs, Technology S - curve, Need analysis, market analysis and competitive analysis, Kano Diagrams, SWOT analysis<br><br>Conceptualization techniques – Idea generation – ideation, brainstorming, Trigger session Brain writing, Mind maps, SCAMPER, TRIZ, Biommicry, Shape mimicry, Familiarity Matrix<br><br>Concepts screening, Concept testing - exploratory tests, Assessment tests , Validation tests Comparison tests – Case studies<br><br>Organization of design concept and design methods, Engineering Design - Descriptive and prescriptive model, Design decisions and development  of   design<br><br>Group work and case studies |
| Textbook | 1. Otto. K  and  Wood, K,  Product  Design,  Pearson Education,  2001.<br>2. Pahl. G  and  Beitz. G,  Engineering  Design,  Springer,  1996 |
| References | 1. Ullman. D. G,  The  Mechanical  Design  Process, McGraw- Hill, 1997. |

## INT108T  -  Science and Engineering of Materials

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|---|---|
| Contents of the course | Crystal structure, defects, crystallographic planes, directions, slip, deformation mechanical behaviour, and strengthening mechanisms. [10h]<br><br>Electrical, electronic, magnetic properties of materials, property management and case studies alloys, steel, aluminum       alloys. [6h]<br><br>Polymeric structures, polymerization, structure property relationships, processing property relationships,. [6h]<br><br>Natural and manmade composites, processing, properties, applications [6h]<br><br>Ceramics, manufacturing and properties, applications [4h]<br><br>Environmental degradation of engineering materials [4h]<br><br>Introduction to Nano, Bio, Smart and Functional materials. [4h] |
| Textbook | 1. Callister's Materials Science and Engineering, 2$^{nd}$ ED, Adapted by R Balasubramaniam, 2010, ISBN-13: 978-8126521432, Wiley India Ltd.<br><br>2.V Raghavan, "Materials Science and Engineering: A First Course, 5$^{th}$ Ed, 2004, PHI India |
| References | 1.  Donlad R. Askeland K Balani, "The Science and Engineering of Materials," 2012, Cengage Learning |

## INT107T  -  English for Communication

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|---|---|
| Contents of the course | Listening – Listening comprehension. Listen to various types of spoken discourses understand, analyse and apply the same.  Listen and comprehend lectures and speeches.(3)<br><br>Speaking – Organization, articulation and correctness. Speak with confidence and present a point of view. Speak coherently and fluently on a given topic.          (8)<br><br>Reading – Comprehend and critically read the text. Read a given text at a reasonable speed (5)<br><br>Writing – Memos, letters, reports, reviews and writing fluently and coherently on a given topic. Write various types of tasks; short and long.     (7)<br><br>Presentation Skills – Oral presentation using Power Point. Study Skills – Dictionary, thesaurus & reference Structure of English – Remedial grammar/ Grammar for Communication        (5) |
| Textbook | 1.   Shreesh Choudhry, Devaki Reddy , Technical English, Macmillan Publishers,2009 |
| References | 1.  Martin Hewings , Advanced English Grammar,  Cambridge University Press,2007.<br>2.  V. Saraswathi, Leena Anil, Manjula Rajan , Grammar for Communication,2012.<br>3. Thomson and Martinet , Practical English Grammar, Oxford University Press, 1986.<br>4. Leech, Geoffrey & Jan Svartvik, A Communicative Grammar of English, Longman,2003 |

# DES102T  -  Design History

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|---|---|
| Contents of the course | Definition of Design; Origin of designers; Historical context of design and designers. Designers and designed products: Art, design and technology - Select International and Indian designers. Industrial Revolution: Mass production, Birth of Modern architecture, International Style, The modern home. Craft and Design: Type forms; William Morris and Arts and Craft Movement; Shantiniketan. Design movements: Art Nuoveau; Art Deco, Werkbund; Bauhaus; De Stijl. Changing values: Information Revolution: Impact of technology, industrialization and globalization on design : kitsch, pastiche, 'retro'; Shopping malls. Design Studies:  Materials and techniques; Chinese ceramics; Typology;  Content analysis : Anthropology / sociology; Nationalist and global trends in Design; Nationalist Design; Global trends and global identity;  Nostalgia, Heritage and Design; |
| Textbook | 1. Conway  Hazel,  Design History – A Students' Handbook, Routledge: London, 1987. |
| References | 1. Raizman  David, History of Modern Design, Graphics and Products since the Industrial   Revolution. Laurence King Publishing :London, 2003<br>2. Walker  John. A, Design History and History of Design. Pluto Press: London, 2003.<br>3. Woodham Jonathan M, Twentieth Century Design, Oxford University Press: Oxford, 2003. |

# MAN102T - Professional Ethics

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|---|---|
| Contents of the course | Professionalism and Ethics: Profession and occupation , Qualities of a professional practitioner, Variety of ethics and moral issues, moral dilemmas; Kohlberg's theory - Gilligan's theory of moral development - consensus and controversy. Values- concept of intrinsic good, instrumental good and universal good.  Kant's theory of good action and formula for universal law of action. Codes of ethics  for engineers: need and scope of a code of ethics; Ethics and Law  (10) Understanding Ethical Problems: ethical theories – utilitarianism, cost-benefit analysis, Duty ethics - Right ethics and virtue ethics. Applications for various case studies. Ethical Problem Solving Techniques: issues-factual, conceptual and moral; Bribery and acceptance of gifts;  Line drawing and flow charting methods  for solving conflict  Problem. (09) Risk, Safety and Accidents: Safety and risk, types of risk, types of accidents and how to avoid accidents. Rights and Responsibilities of an Engineer: Professional responsibility, professional right and whistle blowing. Ethical Issues in Engineering Practice: environmental ethics, computer ethics, ethics and research. (09) |
| Textbook | 1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 |
| References | 1. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000. 2.  Velasquez. M. G, Business Ethics and Cases, 5 Edn, Prentice Hall, 2002. 3.  Sekha. R.C, Ethical Choices in Business Response, Sage Publication, 2002. 4. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw  Hill, 1996. |

# DES103T - Earth, Environment & Design

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|---|---|
| Contents of the course | Introduction to environment and ecology – Ecosystems – Principles concepts, components and function |
| | Atmospheric, aquatic and terrestrial ecosystems – Biogeochemical cycles and limiting factor concepts –Impacts of natural and human activities on ecosystems |
| | Environmental policies, acts and standards – Sustainable development and environmental impact assessment – Institutional frame work and procedures for EIA |
| | Methods for impact identification-matrices – Networks and Check lists – Environmental settings, indices and indicators |
| | Prediction and assessment of the impacts on air, water, land, noise and biological environments – Assessment of impacts of the cultural, socioeconomic and ecosensitive environments |
| | Mitigation measures, economic evaluation – Public participation and design making – Preparation of Environmental statement |
| Textbook | 1. Rubin. E. S, Introduction to Engineering and the Environment, McGraw Hill, 2000.<br>2. Masters. G. M., Introduction to Environmental Engineering & Science, Prentice Hall, 1997. |
| References | 1. Henry. J. G, and Heike, G. W, Environmental Science & Engineering, Prentice Hall International, 1996.<br>2. Dhameja. S. K, Environmental Engineering and Management, S. K. Kataria and Sons, 1999.<br>3. Shyam Divan and Armin Rosancranz, Environmental Law and Policy in India, Cases, Materials and Statutes, Oxford University Press, 2001. |

## INT110P    -    Engineering Skills Practice

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|---|---|
| Contents of the course | Experiments will be framed to train the students in following common engineering practices: Basic manufacturing processes: Fitting – Drilling & tapping – Material joining processes – PCB making – Assembling and testing –  Electrical wiring. Familiarization of  electronic components by Nomenclature, meters, power supplies, function generators and Oscilloscope – Bread board assembling of simple circuits: IR transmitter and receiver – LED emergency lamp – Communication study: amplitude modulation and demodulation –  PCB: designing and making of simple circuits – Soldering and testing of electronic components and circuits –Various types of Domestic wiring practice: Fluorescent lamp connection, Staircase wiring – Estimation and costing of domestic and industrial wiring – power consumption by Incandescent, CFL and LED lamps. |
| Textbook | 1.  Uppal S. L., "Electrical Wiring & Estimating", 5Edn, Khanna Publishers, 2003. 2.  Chapman. W. A. J., Workshop Technology, Part 1 & 2, Taylor & Francis. |
| References | 1.  Clyde F. Coombs, "Printed circuits hand book", 6Edn, McGraw Hill, 2007. 2.  John H. Watt, Terrell Croft, "American Electricians' Handbook: A Reference Book for the Practical Electrical Man", Tata McGraw Hill, 2002. |

## COM105P  -  Computational Engineering Lab

| Contents of the course *(With approximate break up of hours)* | Learning operating system commands - editors – compilation - Assignments on using the operating system and open office suite - Programs involving output statements, input statements and expression evaluation - Assignments covering If-then-else statement iterative statements - Programs using arrays and functions based approach – Recursion sorting (bubble Sort) on a set of integers and a set of strings and linear search over a set of integers and a set of strings - structures and files in C - Implementation of a grading system computation of $e^x$, sin(x) and cos(x) - Bisection and Newton Raphson methods in C. |
|---|---|
| Textbook | 1. Deitel P J and Deitel H M, C : How To Program, Prentice Hall, 7$^{th}$ Edn, 2012. |
| References | 2. Kernighan, Ritchie D, The C Programming Language, Prentice Hall, 2 Edn<br>3. Chapra S.C and Canale R.P, Numerical Methods for Engineers, McGraw Hill, 2006. |

## INT111P  -  Measurement & Data Analysis lab

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|---|---|
| Contents of the course | Role of Experiments and measurements: Evaluation of different measurement techniques in measurement of various physical/chemical/mechanical/electrical/thermal/environmental parameters<br><br>Reporting Methodology: Collection, consolidation and reporting of the data<br><br>Probability and Statistics: Presentation, analysis and interpretation of the data<br><br>Uncertainty/Error Analysis: Performance evaluation and determination<br><br>Signal Characterization, data acquisition  and Analysis: Study of vivid waveforms and digitization process |
| Textbook | 1. Patrick F. Dunn, "Measurement and Data Analysis for Engineering and Science", First Edition, McGraw-Hill Book Company, 2005 |
| References | 2. Julius S. Bendat, Allan G. Piersol, "Random Data: Analysis and Measurement Procedures", 4th Edition, Wiley, 2010<br><br>3. Anthony J. Wheeler, Ahmad Reza Ganji, "Introduction to Engineering Experimentation" 3rd Edition, Prentice Hall, 2010 |

# PHY107P  -  Engineering Electromagnetics Practice

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|---|---|
| Contents of the course | Electrical and magnetic properties of materials based on the concept of electrical polarization, magnetization of materials will be studied in various experiments. Experiments based on theconcept ofphenomena such as interference, diffraction etc. related to electromagnetic waves will be done here and these methods will be applied to measure some unknown physical quantities such as wavelength of a light, diameter of a very thin wire, very small aperture for light etc. |
| Textbook | 1.IIITD&M Laboratory manual for Electromagnetic Wave Practice |
| References | 1. W. H. Hayt and J. A. Buck, Engineering Electromagnetics, Tata McFraw Hill Education Pvt. Ltd, 2006. |

**INT109P    -    Engineering Graphics**

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|---|---|
| Contents of the course *(With approximate break up of hours)* | • Introduction to IS code of drawing (1hr)<br>• Construction of basic shapes (4 hrs)<br>• Dimensioning principles (1hr)<br>• Conventional representations (1 hr)<br>• Orthographic projection of points, lines, planes, right regular solids and objects (17 hrs)<br>• Section of solids and objects (4 hrs)<br>• Isometric projection of objects (6 hrs)<br>• Intersection of solids (4 hrs)<br>• Development of surfaces (4 hrs) |
| Textbook | 1. Narayana. K.L, and Kannaiah. P, Engineering Drawing, Charaotar Publ House, 1998.<br>2. Bhatt. N.D, Engineering Drawing, New Age International, 2007. |
| References | 1. Gopalakrishnan. K.R, Engineering Drawing, Subash Stores, 2002.<br>2. Natarajan. K.V, A text book of Engineering Drawing, Classic Prints, 2000. |

**DES104P  -  Industrial Design Sketching**

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|---|---|
| Contents of the course *(With approximate break up of hours)* | • Role and importance of sketching in industrial design (2 hr)<br>• Principles of perspective drawing (8 hr)<br>• Perspective drawing of planar and curved shapes (12 hrs)<br>• Shading and texturing (8 hrs)<br>• Representation of shadow and reflections (8 hrs)<br>• Colors in Industrial design and coloring (4 hrs)<br>• Introduction to 3D forms and form development (4 hr) |
| Textbook | 1.  Thomas C Wang, Pencil Sketching, John Wiley, 2002.<br>2.  Itten Johannes, Design and Form, John Wiley, 1975. |
| References | 1.  Kasprin Ron, Design Media – Techniques for Water Colour, Pen and Ink Pastel and colored markers, John Wiley,1999. |

## MAT105T - Differential Equations

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|---|---|
| Contents of the course | Linear ordinary differential equations with constant coefficients, method of variation of parameters – Linear systems of ordinary differential equations (10)<br>Power series solution of ordinary differential equations and Singular points<br>Bessel and Legendre differential equations; properties of Bessel functions and Legendre Polynomials (12)<br>Fourier series (6)<br>Laplace transforms elementary properties of Laplace transforms, inversion by partial fractions, convolution theorem and its applications to ordinary differential equations (6)<br>Introduction to partial differential equations, wave equation, heat equation, diffusion equation (8) |
| Textbooks | 1. Simmons. G.F, Differential Equations, Tata McGraw Hill, 2003.<br><br>2. Kreyszig. E, Advanced Engineering Mathematics, Wiley, 2007. |
| References | 1. William. E. Boyce and R. C. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 8 Edn, 2004.<br><br>2. Sneddon. I, Elements of Partial Differential Equations, Tata McGraw Hill, 1972.<br><br>3. Ross. L.S, Differential Equations, Wiley, 2007.<br><br>4. Trench, W, Elementary Differential Equations, http://digitalcommons.trinity.edu/mono |

## PHY108T - Engineering Mechanics

| | |
|---|---|
| Contents of the course | Equivalent force systems; free-body diagrams; degrees of freedom; equilibrium equations; analysis of determinate trusses and frames; properties of surfaces - friction; (10)<br><br>Particle Dynamics: equations of motion; work-energy and impulse-momentum principles;. Generalized coordinates; Lagrangian mechanics. (12)<br><br>Rigid body dynamics: plane kinematics and kinetics of rigid bodies including work-energy and impulse-momentum principles; single degree of freedom rigid body systems (10)<br><br>Stresses and strains (including thermal starin); principal stresses and strains; generalized Hooke's Law; free vibration of single degree-of freedom systems. (10) |
| Textbook | 1. F. Beer. R. Johnston, Vector mechanics for engineers: statics and dynamics. Tata McGraw-Hill, 2010. |
| References | 1. Meriam. J. L and Kraige. L. G, Engineering Mechanics, Vol. I – Statics,  Vol 2: Dynamics, 2007.<br><br>2. H. Goldstein , Classical Mechanics, Pearson Education, 2011.<br><br>3. Kittle. C, Mechanics – Berkley Physics Course, Vol. 1, Tata McGraw Hill, 2008. |

# PHY109P   -   Basic Materials & Mechanics Practice

| | |
|---|---|
| Contents of the course | Experiments here will give hand on experience of concepts of small oscillations, friction, elasticity and strength of material.<br><br>Experiments will be done to measure various properties of different mechanical objects such as  object such rigidity modulus, Young's modulus, radius of gyration etc.<br><br>Study of material properties such as microstructure, hardness, response to tensile load and long-term constant loading etc. will also be done in various experiments. |
| Textbook | 1. IIITD&M Laboratory manual for Mechanics and Materials Practice |
| References | 1. F. Beer. R. Johnston, Vector mechanics for engineers: statics and dynamics. Tata McGraw-Hill, 2010.<br><br>2.Callister's Materials Science and Engineering, $2^{nd}$ ED, Adapted by R Balasubramaniam, 2010,Wiley India Ltd. |

# DES105P   -   Design Realization

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|---|---|
| Contents of the Course | The students are exposed to tools and equipments to machine external appearance of products of simple shapes. Wood carving, Plastic welding and cutting, engraving, sheet metal works, wire cutting are some of the process that the students will learn and use for product realization. The students will also be exposed high end machines to realize the product during demo sessions. Few sessions will be allocated to re-design an existing simple products in terms of shape, size functionality etc. |