FIRST YEAR B TECH PROGRAM STRUCTURE 2024-2025 (CSE STREAM)

PHYSICS CYCLE/GROUP

Year	FIRST SEMESTER						SECOND SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
I	MAT 1172	Computational Mathematics - I	3	1	0	4	MAT 1272	Computational Mathematics - II	3	1	0	4
	PHY 1072	Applied Physics for Engineers	3	0	0	3	CHM 1072	Applied Chemistry for Engineers	3	0	0	3
	ECE 1072	Fundamentals of Electronics	2	1	0	3	ELE 1072	Fundamentals of Electrical Engineering	2	1	0	3
	CSE 1171	Programming for Problem Solving	2	1	0	3	DSE 1271	Data Visualisation	1	0	3	2
	MIE 1072	Basic Mechanical Engineering Science	3	0	0	3	ICT 1271	Introduction to Object Oriented Programming	3	0	0	3
	HUM 1071	Communication Skills in English	1	0	2	2	CIE 1072	Environmental Studies	1	0	2	2
	IPE 1071	Universal Human Values and Professional Ethics	1	0	0	1	CIE 1073	Engineering Mechanics and Smart Buildings	2	1	0	3
	HUM 1072	Human Rights and Constitution	1	0	0	1	ICT 1281	Introduction to Object Oriented Programming Lab	0	0	3	1
	MIE 1082	Workshop Practice	0	0	3	1	MIE 1083	Computer Aided Engineering Graphics	0	0	3	1
	CSE 1181	Programming for Problem Solving Lab	0	0	3	1	IPE 4302	Creativity, Problem Solving & Innovation*	1	0	0	--*
	IPE 4302	Creativity, Problem Solving & Innovation*	1	0	0	--*						
			17	**3**	**8**	**22**			**16**	**3**	**11**	**22**
	Total Contact Hours (L + T + P)		**28**				**Total Contact Hours (L + T + P)**		**30**			

*After completing a project work along with other activities which are assessed periodically the students would earn 3 credits which would be considered in lieu of an open elective for Fifth semester B Tech

FIRST YEAR B TECH PROGRAM STRUCTURE 2024-2025 (CSE STREAM)

CHEMISTRY CYCLE/GROUP

Year	FIRST SEMESTER						SECOND SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
I	MAT 1172	Computational Mathematics - I	3	1	0	4	MAT 1272	Computational Mathematics - II	3	1	0	4
	CHM 1072	Applied Chemistry for Engineers	3	0	0	3	PHY 1072	Applied Physics for Engineers	3	0	0	3
	ELE 1072	Fundamentals of Electrical Engineering	2	1	0	3	ECE 1072	Fundamentals of Electronics	2	1	0	3
	CSE 1171	Programming for Problem Solving	2	1	0	3	MIE 1072	Basic Mechanical Engineering Science	3	0	0	3
	CIE 1072	Environmental Studies	1	0	2	2	DSE 1271	Data Visualisation	1	0	3	2
	CIE 1073	Engineering Mechanics and Smart Buildings	2	1	0	3	ICT 1271	Introduction to Object Oriented Programming	3	0	0	3
	IPE 1071	Universal Human Values and Professional Ethics	1	0	0	1	HUM 1071	Communication Skills in English	1	0	2	2
	HUM 1072	Human Rights and Constitution	1	0	0	1	MIE 1082	Workshop Practice	0	0	3	1
	CSE 1181	Programming for Problem Solving Lab	0	0	3	1	ICT 1281	Introduction to Object Oriented Programming Lab	0	0	3	1
	MIE 1083	Computer Aided Engineering Graphics	0	0	3	1	IPE 4302	Creativity, Problem Solving & Innovation*	1	0	0	--*
	IPE 4302	Creativity, Problem Solving & Innovation*	1	0	0	--*						
			16	**4**	**8**	**22**			**17**	**2**	**11**	**22**
	Total Contact Hours (L + T + P)		**28**				**Total Contact Hours (L + T + P)**		**30**			

*After completing a project work along with other activities which are assessed periodically the students would earn 3 credits which would be considered in lieu of the open elective for Fifth semester B Tech

MAT 1172: COMPUTATIONAL MATHEMATICS-1 [3 1 0 4]

Course Outcome (COs):

- CO1: To apply matrix algebra concepts to find efficient solutions of computing problems.
- CO2: To analyse notions of vector space, spanning set, basis, linear independence, and construction of orthonormal basis to solve critical problems.
- CO3: To apply solutions of first and higher order ordinary differential equations arising from practical problems using analytical methods.
- CO4: To determine approximate solutions of algebraic, transcendental, non-linear equations by numerical methods.
- CO5: To apply the concept of interpolation in finding solutions of numerical differentiation and integration problems.

Syllabus:

Matrix Algebra: Elementary column and row transformations, Inverse of a matrix by elementary row operations, Echelon form and rank of a matrix, System of linear equations: Consistency, Solution by Gauss elimination, Gauss-Jordan, Jacobi and Gauss-Seidel methods, Eigen values and eigen vectors: Elementary properties, Spectral Matrix Decomposition, Diagonalisation, power of a matrix. Vector Spaces: Generalization of vector concept to higher dimensions, Generalised vector operations, Vector spaces and sub spaces, Linear independence and span, basis. Inner product spaces and Gram-Schmidt process of orthogonalization. Linear transformations. Differential Equations and Applications: Linear differential equations of first and higher order. Solution of homogeneous and nonhomogeneous linear equations using inverse differential operators, method of variation of parameters, and method of undetermined coefficients. Solution of Algebraic and Transcendental Equations: Tracing of parametric curves: Cycloid and related curves. Bisection method, Method of false position, Newton-Raphson method. Solution of System of Non-linear equations using Newton-Raphson method. Interpolation: Finite differences and divided differences. Newton-Gregory and Lagrange's interpolation formulae. Newton's divided difference interpolation formula. Discrete Numerical differentiation, Numerical integration: Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule. Numerical solution of ordinary differential equations: Taylor's series method, Modified Euler's method, Runge-Kutta methods.

Reference Books:

1. B.S.Grewal, *Higher Engineering Mathematics*, 43^{nd} edition, 2015, Khanna Publishers.
2. Kreyzig E, *Advanced Engineering Mathematics*, 9^{th} edition, 2011, Wiley Eastern , Delhi.
3. David C. Lay, *Linear Algebra and Applications*, 3^{rd} edition, 2009, Pearson Education.

4. Sastry S.S - *Introductory methods of Numerical analysis*, 5th edn., PHI learning Pvt. Ltd, 2012.
5. Rainville E.D. and Bedient P.E., *A short course in differential equations*, 8th edition, 2011, Prentice Hall, New York.
6. Sheldon Axler, *Linear Algebra Done Right*, Springer 2014.

MAT 1272: COMPUTATIONAL MATHEMATICS-II [3 1 0 4]

Course Outcome (COs):

- CO1: To apply partial differentiation, regression concepts in finding extreme values of functions, best fit for data.
- CO2: To apply multiple integrals for mensuration such as area of plane region and volume of three-dimensional solids.
- CO3: To analyse infinite series like harmonic series, power series and confer about their convergence or divergence
- CO4: To analyse recurrent, combinatorial problems and finding efficient solutions through computing techniques.
- CO5: To apply results from Laplace Transforms on shifting property, convolution theorem, periodic functions and step functions, which gives rise to the solution of initial value problems.

Syllabus:

Partial Differentiation: Continuity of functions of two variables, Definition of partial derivative, Euler's theorem on homogeneous functions, Total derivative, Derivatives of composite & implicit functions. Errors and approximations. Taylor's theorem for functions of two variables, Maxima and Minima, Lagrange's method of undetermined multipliers, Linear Regression Models. Multiple Integrals: Definitions of Double and Triple integrals, Evaluation by the change of order of integration, change of variables, Jacobians. Applications to areas and volumes. Beta and Gamma functions and simple problems. Sequences and Series: Convergent sequences, computing sequence limits. Convergence and divergence of an infinite series. Tests: comparison test, ratio test, Cauchy's root test, Raabe's test, Integral test. Alternating series: Leibnitz's theorem, absolute and conditional convergence with problems. Power series. Efficient Computing Techniques: Modular Exponentiation by Repeated Squaring, Modular Multiplicative Inverse, Lucas Theorem to compute ${}^{n}C_{r}$, Primality Tests, Sieve of Eratosthenes and its implementation on a computer, Recurrent Problems, The Tower of Hanoi, Lines in the Plane, The Josephus Problem.

Laplace Transforms: Transforms of elementary functions, shifting theorems, Transforms of periodic functions, Unit step function. Inverse Laplace transforms. Convolution and Applications.

Reference Books:

1. B.S.Grewal - *Higher Engineering Mathematics*, , 43nd edition, 2015, Khanna Publishers.
2. N.Piskunov-*Differential Calculus*, Vol I and II, 1996, Mir Publications .
3. Rainville E.D and Bedient P.E. *A short course in differential equations*, 8th edition, 2011, Prentice hall, New York.
4. Kreyzig E, *Advanced Engineering Mathematics*, 8th edition, 2006, Wiley Eastern, Delhi.
5. Shanti Narayan - *Differential Calculus*, 6th edition, 2014, Shyam Lal Charitable Trust, Delhi
6. Karl Beecher, Computational Thinking: *A beginner's guide to problem-solving and programming* (2017), BCS Publ.
7. Ronald L. Graham, Donald E. Knuth and Oren Patashnik, *Concrete Mathematics: A Foundation for Computer Science* (2nd Ed.) by (1994), Pearson Publ.

PHY 1072: APPLIED PHYSICS FOR ENGINEERS [3 0 0 3]

Characteristics of Lasers, Spontaneous and Stimulated emission, Einstein's coefficients Population Inversion, He-Ne Laser, Ruby Laser, Semiconductor Laser. Principle of optical fibre, acceptance angle and acceptance cone, Numerical aperture, Step-index and Graded index fibre, single mode and multi-mode fibres, attenuation and distortion in optical fibres. Black body radiation laws, Planck's hypothesis, Overview of photoelectric effect, The Compton effect, derivation of Compton shift equation, Overview of wave particle duality, Davisson and Germer Experiment. Quantum particle, wave packet, phase speed and group speed. The double-slit experiment revisited, Overview of uncertainty principle. The Schrodinger equation, the quantum particle under boundary conditions, particle in a box, Particle in a well of finite height, Tunnelling through a potential barrier and its applications. Dirac ket notation, The postulates of quantum mechanics. Moore's law, Single particle quantum interference, Classical & quantum information comparison. Differences between classical & quantum computing, quantum superposition and the concept of qubit. Properties of a qubit: Mathematical representation. Summation of probabilities, Representation of qubit by Bloch sphere. Quantum Gates: Single Qubit Gates: Quantum Not Gate, Pauli -Z Gate Hadamard Gate, Pauli Matrices, Phase Gate (or S Gate), T Gate. Multiple Qubit Gates: Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of, Swap gate, Controlled -Z gate, Toffoli gate.

Reference Books:

1. PHYSICS for Scientists and Engineers with Modern Physics, Jewett & Serway, Cengage Learning, 7TH edition
2. Introduction to Fiber Optics, Ajoy Ghatak and K. Thyagarajan, Cambridge University Press, 2010.
3. Engineering Physics, S. P. Basavaraju, Subhas Stores, Bangalore – 2

4. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
5. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
6. A text book of Engineering Physics, M N Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, S Chand and Company Ltd. New Delhi-110055, Eleventh edition

CHM 1072: APPLIED CHEMISTRY FOR ENGINEERS [3-0-0-3]

Battery Technology :

Introduction to batteries. Lead-acid batteries, Nickel-metal hydride batteries, Lithium-ion batteries. Limitations and Sustainability Concerns. Case study

Materials Chemistry :

Introduction to polymers. Engineering polymers. Characterisation tools. Polymers for sustainability. Nanomaterials. Liquid Crystal Displays (LCDs). Organic Light-Emitting Diode (OLED) Displays. Emerging Display Technologies. Case study

Chemistry of Electronic Materials :

Classification of materials. Band theory of solids. Classification of sensors, Chemical and Electrochemical sensors. Case study

E-waste generation and management: (self-study topics) :

Environmental contamination through improper e-waste disposal. Case studies. Reimagine, Reduce, Reuse. Hazardous Chemicals in Electronics and Environmental Impact

Virtual Lab :

1. Li ion battery
2. Viscometry
3. Flame photometry
4. Colorimetry
5. pH sensor
6. Circular Economy approach

ECE 1072: FUNDAMENTAL OF ELECTRONICS

Analog Electronics: Rectifiers using diode, Rectifier Capacitor Filter, Zener Regulator, MOSFET amplifiers, Block diagram representation of Op-Amp, Op-Amp parameters, Linear and non - linear applications of Op-Amp.

Digital Electronics: Number system classification, One’s and two’s complements, weighted and non-weighted codes, Self-complimenting codes, error detecting and correcting codes, Boolean algebraic theorems and simplification of Boolean expressions, Basic and Universal logic gates, Implementation of Boolean expressions using logic gates, Standard form of Boolean expression, Simplification of Boolean expressions using K-map and implementation using logic gates, Multiplexers and Demultiplexers, JK, SR, D and T flip-flops, Binary counters, Shift registers, Finite State Machines, Moore’s and Mealy model.

References:

1. Robert L. Boylestad, Louis Nashelsky- Electronic Devices & Circuit Theory, 11th Edition, PHI, 2012
2. Behzad Razavi, "Fundamental of Microelectronics", Wiley, 2013.
3. Morris Mano- Digital design, Prentice Hall of India, Third Edition, 2013.
4. George Kennedy, Bernad Davis- Electronic Communication Systems, Fourth edition, TMH, 2004.
5. Raj Pandya, "Mobile and Personal Communication Services and Systems", Wiley-IEEE Press,1999.

CIE 1073: ENGINEERING MECHANICS AND SMART BUILDINGS [2 1 0 3]

Introduction to engineering mechanics, Rigid body, Force and system of forces, Composition, and Resolution of forces, Moment of forces, Varignon's theorem, Couple, Resultant of force system. Conditions of Equilibrium, Space diagram, and free body diagram, Lami's theorem, Equilibrium of concurrent and non-concurrent force systems, Friction. (10 Hours)

Introduction to deformable bodies, Mechanical properties of materials, Stress, Strain, Hooke's law. Stress-strain behaviour of ductile and brittle material, Factor of safety, Stresses and deformations in prismatic, stepped, and tapered bars. Shear stress and strain, Poison's ratio, Volumetric stress and strain, Elastic constants and their relationships. (10 Hours)

Smart building systems: HVAC, lighting control systems, access control systems, fire alarm notification, video IPTV, audio-visual system, energy, and sustainability. Case study on Building automation. Fundamentals of instrumentation and measuring systems in civil Engineering for recording parameters such as strain, force, displacement, distance, temperature, humidity, and pH. Case studies on the Application of Cloud computing & and IoT in construction safety and security. Fundamentals of Virtual Reality, Augmented Reality and Building Information Modelling, Transitioning of BIM to Digital Twins. (16 Hours)

Reference Books:

1. Beer F. P., Johnston Jr. E. R., Dewolf J. T., Mazurek D. F., Sanghi S., Mechanics of Materials (7e), Tata McGraw-Hill, 2017.
2. Bhavikatti S. S., Strength of Materials (4e), Vikas Publishers, 2013.
3. James Sinopli, Smart building systems for Architects, owners and builders, Elsevier, Butterworth-Heinemann Publications, 2010
4. A.K.Ghosh, "Introduction to Measurements & Instrumentation", IIIrd, PHI
5. Eastman, C; Teicholz, P; Sacks, R; Liston, K, BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors:NewYork: Wiley. 2011

MIE 1072: BASIC MECHANICAL ENGINEERING SCIENCE [3 0 0 3]

Course Outcome:

- Apply the principles of engineering fundamentals to compute the basic thermodynamic properties of steam, the basic engine performance parameters and to design the power transmission systems.
- Suggest the suitable mechanical processes, methods and/or devices to be employed based on the given operating conditions.
- Explain the working principles of various mechanical systems, devices and/or processes.
- Explain the working of various futuristic technologies and discuss their merits and demerits over the conventional technologies.
- Discuss the environmental and societal impact of various processes, methods and materials used in mechanical engineering systems and suggest alternative methods based on ethical principles and norms of engineering practice, to minimise adverse impacts.
- Demonstrate the ability to communicate and work individually or in a team to achieve the required outcome through self-directed and experiential learning.

Principles of Thermodynamics, Laws of Thermodynamics, Principles and modes of heat transfer, Numerical. Properties of Steam: Formation of steam at constant pressure. Numerical. Refrigeration: Principle and working of vapour compression refrigeration system, Concepts and types of Air conditioning system, Numerical; I.C. Engines: Classification, 4 - stroke C.I and S.I Engines, Numerical. Power Transmission: Belt drives, Gear Drives, Numerical. Manufacturing Process: Introduction to Lathe, Drilling Machine and operations, Numerical. Automation and Advanced Manufacturing: Computer-Aided Design (CAD) Basics- Introduction to CAD. Introduction to automation, CNC machines, Robotics, robot configuration, application of robotics, additive manufacturing. Internet of Things (IoT) in Mechanical Systems- Basics of IoT, IoT Applications in Mechanical Engineering.

Reference Books:

1. K. R.Gopalakrishna, Text book of elements of Mechanical Engineering, Subhash Publications, Bangalore, 2005.
2. Rajput R. K., Elements of Mechanical Engineering, Fire Wall Media, 2005.
3. Groover Mikell P., Automation, Production systems, and Computer-Integrated Manufacturing. Pearson Education India, 2016.
4. HMT Limited, Mechatronics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

5. Maciej Kranz, "Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry", Wiley, 2016

ELE 1072: FUNDAMENTALS OF ELECTRICAL ENGINEERING [2 1 0 3]

Electric circuit analysis – Ohm's law, Kirchhoff's laws, loop and node analyses, source transformation, star-delta conversion, network theorems to DC circuits; DC Transients – RL, RC and RLC circuits; Single phase AC circuits - sinusoidal steady state analysis – phasors, network theorems, power; resonance; Polyphase circuits – 3 phase circuits. **(18 Hours)**

Magnetic field – Basic laws, magnetic materials, BH characteristics, hysteresis and eddy current losses. Magnetically coupled circuits; Transformers – single phase and auto-transformers. Electro-mechanical energy conversion systems – DC machines, AC Machines, Special machines. **(6 Hours)**

Introduction to Electrical Power Systems: AC and DC systems, Electric power generation, transmission and distribution, utilisation and costing of electricity. Power connections for critical loads, Electric safety. **(6 Hours)**

Introduction to Power Electronics: Power Semiconductor Devices; Power converter classifications; Application: SMPS and UPS Systems, Electric Vehicles, Integration of PV to grid, etc. **(6 Hours)**

Reference Books:

1. Nagrath I.J. and D. P. Kothari; Basic Electrical Engineering (4 Ed); Tata McGraw Hill (2019).
2. William H. Hayt, Jack Kemmerly, and Steven M. Durbin; Engineering Circuit Analysis (8 Ed); Tata McGraw Hill (2013).
3. Daniel W. Hart; Power Electronics; McGraw Hill (2011).
4. Debapriya Das; Fundamentals of Electrical Engineering; NPTEL Course – IIT Kharagpur (2018).

CSE 1171: PROGRAMMING FOR PROBLEM SOLVING [2 1 0 3]

Introduction to computing, Importance of Problem solving using computers, Algorithms and Flow charts, From algorithms and flowcharts to programs, Introduction to programming using C language, Simple C programs, Syntax and Logical Errors in compilation, Object and executable code, Data concepts in C, Operators in C, Expressions and Precedence, Input and output statements, Decision Making Statements: IF, IF-ELSE, Nested IF-ELSE, ELSE-IF

Ladder, Switch, Looping Statements: WHILE, DO-WHILE and FOR constructs, Control structures, 1-D, Multidimensional arrays: 2-D arrays and strings, Searching and sorting, Modularization, functions, and recursive functions, Pointers, Pointer arithmetic, Structures: Defining structures, Array of Structures, Pointer to structures, Files Concept.

Reference Books:

1. Computer fundamentals and programming in C, "Reema Thareja", Oxford University, Second edition, 2017.
2. Dromey.R. G, *How to solve it by computers*, Pearson Education, 2007.
3. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming language (2e),* Pearson India, 2015.
4. Deital. P and Deitel. H. M, *C: How to program (9e),* Pearson, 2022.
5. Balagurusamy.E, *Computing fundamentals and C programming (2e),* MC GRAW HILL INDIA, 2017.

CSE 1181: PROGRAMMING FOR PROBLEM SOLVING LAB [0 0 3 1]

Familiarization with programming environment, Simple computational problems using C programming, Problems involving branching control structures, Iterative Problems, 1D array manipulation, 2D array programming (matrices), String operations, Introduction to Modular programming and solving problems using modularization, Recursive functions programming, Programs with pointers, structures, File operations.

Reference books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming language (2e),* Pearson Education, 2015.
3. Deital.P. J and Deitel.H.M, *C: How to program (7e),* Pearson Education, 2010.
4. Balagurusamy.E, *Computing fundamentals and C programming (1e),* MC GRAW HILL INDIA, 2017.

ICT 1271: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING [2 1 0 3]

Course Objectives

· To understand complexity of software and clarity on decomposing it in function oriented and object oriented way.

· To design classes and objects and their relations based on problem definition

· To implement the designed solution using an object oriented language.

Abstract

Programming paradigms, Complexity of software, bringing order to chaos, object model, object oriented design, object oriented analysis, object oriented programming, elements of object model, abstraction, encapsulation, modularity, typing, concurrency, applying the object model, classes, objects, state behavior, simple relationships among objects, The nature of a class, simple relationship among classes, the interplay of classes and objects, building quality classes and objects, classification. Introduction to Input/Output statements in C++, data types, classes, objects, member function overloading, array of objects, passing objects to functions, composition.

Course Outcome:

At the end of the course student will be able to:

1. Apply object oriented design to the given problem
2. Identify classes, objects, members related to the given problem.
3. Demonstrate the simple object oriented programs.

References

1. Brahma Dathan, Sarnath Ramnath, ”Object Oriented Analysis, Design and Implementation”, (2e) Springer 2015.
2. Grady Booch et.al. “Object oriented design and analysis applications”, (3e), Pearson Education, 2009.
3. Bhushan Trivedi, “Programming with ANSI C++”, Oxford Press, (2e), 2012.
4. Balagurusamy E, “Object Oriented Programming with C++”, (4e) Tata McGraw Hill Education Pvt.Ltd , 2010.

ICT 1281: OBJECT ORIENTED PROGRAMMING LAB [0 0 3 1]

Course Objectives

· Understand the fundamentals of object oriented design.
· Writing and enhancing classes, arrays, polymorphism etc.
· Solve any problem using Object oriented programming concepts

Abstract

Modeling using object oriented design and analysis. C++ program writing and execution, Illustration of input,output statements Data types, Variable and arrays, Operators and control statements, Classes and objects, arrays, Passing and returning objects, array of objects, object composition etc.

Outcomes

At the end of this course, the student will be able to

1. Elucidate the object oriented design for a given problem definition
2. Write simple applications using C++ (data types, operators, arrays, variables)
3. Build simple programs using object oriented concepts in C++

References

1. Brahma Dathan, Sarnath Ramnath, ”Object Oriented Analysis, Design and Implementation”, (2e) Springer 2015.
2. Grady Booch et.al. “Object oriented design and analysis applications”, (3e), Pearson Education, 2009.
3. Bhushan Trivedi, “Programming with ANSI C++”, Oxford Press, (2e), 2012.
4. Balagurusamy E, “Object Oriented Programming with C++”, (4e) Tata McGraw Hill Education Pvt.Ltd , 2010.

MIE 1083: COMPUTER AIDED ENGINEERING GRAPHICS [0 0 3 1]

Introduction – Geometrical constructions, Dimensioning and conventions of lines.

Projection of points – Theory of Orthographic projections, Reference planes, Quadrants, Types of quadrants, Conventional representation of first angle projection system, projection of points in the first Quadrant only.

Projection of straight lines – Line parallel to both reference planes, Line perpendicular to either horizontal or vertical or profile plane, Line inclined to horizontal plane, Line inclined to vertical plane, Line inclined to both horizontal and vertical planes, Finding true length and true inclinations.

Projection of plane surfaces – Projections of regular planes (Triangle, Square, Rectangle, Pentagon, Hexagon and Circle), plane resting on edge and corner conditions, Surface inclined to HP and perpendicular to VP, Surface inclined to VP and perpendicular to HP.

Projection of solids – Projection regular solids like prisms & pyramids(Triangle, Square, Rectangle, Pentagon and Hexagon), Cone and cylinder, Solids resting on edge and corner conditions, Axis inclined to HP and parallelto VP, Axis inclined to VP and parallel to HP.

Isometric to orthographic conversion – Orthographic projections of machine components to be drawn.

Isometric projection – Isometric scale, Isometric projection of simple machine components.

DSE 1271: DATA VISUALIZATION [1 0 3 2]

Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Tools for Data Analysis, Arrays and vectorized computation, Summarizing and Computing Descriptive Statistics. Data Loading, Storage and File Formats. Data Wrangling: Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting. Data Visualization: plots, Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation, Time Series Data Analysis: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone

Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions.

Course Outcomes:

On successful completion of the course, the students will be able to :

1. Proficiently utilize data analysis tools within the pandas library.
2. Manage tasks such as loading, cleaning, transforming, merging, and reshaping data.
3. Develop insightful visualizations and effectively summarize datasets.
4. Demonstrate competence in analysing and manipulating time series data.
5. Apply acquired skills to solve real-world data analysis problems with practical and strategic approaches.

Textbooks:

1. McKinney, W., Python for Data Analysis: Data Wrangling with Pandas, NumPy and Python. 2nd edition. O'Reilly Media, 2017
2. O'Neil, C., & Schutt, R., Doing Data Science: Straight Talk from the Frontline, O'Reilly Media, 2013
3. B. Root, Python Plotting with Matplotlib. Packt Publishing, 2014.
4. J. VanderPlas, Python Data Science Handbook. O'Reilly Media, 2016.