HERITAGE INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under MAKAUT)

COURSE STRUCTURE and DETAIL SYLLABUS
(UPTO 1 YEAR)

B. Tech in Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
July, 2023

(Applicable from 2023 admitted batch)

FIRST YEAR
FIRST SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	PHY1001	Physics-I	3	0	0	3	3
2	MTH1101	Mathematics-I	3	1	0	4	4
3	ECE1001	Introduction to Electronics Devices & Circuits	3	0	0	3	3
4	HUM1002	Universal Human Values and Professional Ethics	2	1	0	3	3
Total Theory			**11**	**2**	**0**	**13**	**13**
B. Practical							
1	PHY1051	Physics-I Lab	0	0	2	2	1
2	ECE1051	Introduction to Electronics Devices & Circuits Lab	0	0	2	2	1
3	MEC1051	Workshop / Manufacturing Practice	1	0	3	4	2.5
4	MEC1052	Engineering Graphics and Design	1	0	3	4	2.5
Total Practical			**2**	**0**	**10**	**12**	**7**
Total of Semester			**13**	**2**	**10**	**25**	**20**

FIRST YEAR
SECOND SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CHM1001	Chemistry-I	3	0	0	3	3
2	MTH1201	Mathematics-II	3	1	0	4	4
3	CSE1001	Programming for Problem Solving	4	0	0	4	4
4	ELE1001	Basic Electrical Engineering	3	1	0	4	4
5	HUM1001	English for Technical Writing	2	0	0	2	2
Total Theory			**15**	**2**	**0**	**17**	**17**
B. Practical							
1	CHM1051	Chemistry-I Lab	0	0	2	2	1
2	CSE1051	Programming for Problem Solving Lab	0	0	3	3	1.5
3	ELE1051	Basic Electrical Engineering Lab	0	0	2	2	1
4	HUM1051	English for Technical Writing Lab	0	0	2	2	1
Total Practical			**0**	**0**	**9**	**9**	**4.5**
Total of Semester			**15**	**2**	**9**	**26**	**21.5**

SECOND YEAR
FIRST SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSE2101	Data Structures and Algorithms	4	0	0	4	4
2	DSC2101	Python Programming	3	0	0	3	3
3	AML2101	Data Mining	3	0	0	3	3
4	MTH2102	Probability and Statistical Methods	4	0	0	4	4
5	MTH2103	Discrete Mathematics	4	0	0	4	4
Total Theory			**18**	**0**	**0**	**18**	**18**
B. Practical							
1	CSE2151	Data Structures and Algorithms Lab	0	0	3	3	1.5
2	DSC2151	Python Programming Lab	0	0	3	3	1.5
3	AML2151	Data Mining Lab	0	0	3	3	1.5
4	AML2155	Design Thinking and Idea Lab	0	0	2	2	1
Total Practical			**0**	**0**	**11**	**11**	**5.5**
Total of Semester			**18**	**0**	**11**	**29**	**23.5**

SECOND YEAR
SECOND SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSE2201	Design & Analysis of Algorithms	4	0	0	4	4
2	CSE2202	Computer Organization and Architecture	4	0	0	4	4
3	AML2201	Introduction to Artificial Intelligence	4	0	0	4	4
4	ECE2002	Digital Circuit Design	4	0	0	4	4
5	AEI2206	Introduction to Smart Sensing Technology for AI	3	0	0	3	3
6	EVS2016	Environmental Sciences (Mandatory)	2	0	0	2	0
Total Theory			**21**	**0**	**0**	**21**	**19**
B. Practical							
1	CSE2251	Design & Analysis of Algorithms Lab	0	0	3	3	1.5
2	CSE2252	Computer Architecture Lab	0	0	2	2	1
3	AML2251	AI Lab	0	0	3	3	1.5
4	ECE2052	Digital Circuit Design Laboratory	0	0	3	3	1.5
Total Practical			**0**	**0**	**11**	**11**	**5.5**
Total of Semester			**21**	**0**	**11**	**32**	**24.5**

THIRD YEAR

FIRST SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSE3101	Database Management Systems	4	0	0	4	4
2	AML3001	Fundamentals of Machine Learning	3	0	0	3	3
2	AML3102	Introduction to Operating Systems	3	0	0	3	3
5	XXX3131 - XXX3140	Professional Elective-I	3	0	0	3	3
	CSE3133 Web Technologies **CSE3135** Randomized Algorithms AML3131 Introduction to Soft Computing AML3133 Introduction to Information Retrieval **MTH3131** Linear Algebra for Data Analysis						
6	AML3141 - AML3150	Professional Elective-II	3	0	0	3	3
	AML3141 Introduction to Image Processing AML3142 Fundamentals of Computer Networks AML3143 Introduction to Software Engineering AML3144 Introduction to Object Oriented Programming						
7	****	Open Elective-I	3	0	0	3	3
Total Theory			**19**	**0**	**0**	**19**	**19**
B. Practical							
1	CSE3151	Database Management Systems Lab	0	0	3	3	1.5
2	AML3051	Fundamentals of Machine Learning Lab	0	0	3	3	1.5
3	AML3152	Introduction to Operating Systems Lab	0	0	3	3	1.5
4	AML3171 - AML3180	Professional Elective - II LAB	0	0	3	3	1.5
	AML3171 Introduction to Image Processing Lab AML3172 Fundamentals of Computer Networks Lab AML3173 Introduction to Software Engineering Lab AML3174 Introduction to Object Oriented Programming Lab						
Total Practical			**0**	**0**	**12**	**12**	**6**
Total of Semester			**19**	**0**	**12**	**31**	**25**

THIRD YEAR
SECOND SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSE3002	Formal Language & Automata Theory	4	0	0	4	4
2	AML3202	Deep Learning	3	0	0	3	3
3	HUM3201	Economics for Engineers	3	0	0	3	3
4	AML3231 - AML3240	Professional Elective-III	3	0	0	3	3
	CSE3235 IOT3231 AML3231 AML3232	Cloud Computing Big Data and IoT Stochastic Theory Introduction to Cryptography					
6	*****	Open Elective-II	3	0	0	3	3
7	INC3016	Indian Constitution and Civil Society (Mandatory)	2	0	0	2	0
Total Theory			**18**	**0**	**0**	**18**	**16**
B. Practical							
1	AML3252	Deep Learning Lab	0	0	3	3	1.5
Total Practical			**0**	**0**	**3**	**3**	**1.5**
C. Sessional							
1	AML3293	Term Paper and Seminar	0	0	4	4	2
2	AML3295	Project-I	0	0	4	4	2
Total Sessional			**0**	**0**	**8**	**8**	**4**
Total of Semester			**18**	**0**	**11**	**29**	**21.5**

FOURTH YEAR
FIRST SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	HUM4101	Principles of Management	3	0	0	3	3
2	XXX4131 - XXX4140	Professional Elective-IV	3	0	0	3	3
	CSE4038 AML4131 AML4132 AML4133	Mobile Computing Introduction to Compiler Design Introduction to Robotics Fundamentals of Business Analytics					
3	XXX4141 - XXX4150	Professional Elective-V	3	0	0	3	3
	CSE4141 CSE4143 CSE4145 CSE4146 **AML4141**	Natural Language Processing Pattern Recognition Social Network Analysis Computer Vision Web Mining and its Applications					
4	****	Open Elective-III	3	0	0	3	3
5	****	Open Elective-IV	3	0	0	3	3
Total Theory			**15**	**0**	**0**	**15**	**15**
B. Sessional							
1	AML4191	Industrial Training / Internship	**-**	**-**	**-**	**-**	**2**
2	AML4195	Project-II	0	0	6	6	3
Total Sessional			**0**	**0**	6	6	**5**
Total of Semester			**15**	**0**	**6**	**21**	**20**

FOURTH YEAR
SECOND SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1	AML4295	Project-III	0	0	10	10	5
2	AML4297	Comprehensive Viva-voce	-	-	-	-	2
Total Sessional			**0**	**0**	**10**	**10**	**7**
Total of Semester			**0**	**0**	**10**	**10**	**7**

Heritage Institute of Technology, Kolkata (HIT-K) – Credit Summary for B Tech Programmes with effect from 2023-2024

Sl. No.	Course Type	AICTE Suggested for CSE (AIML) as per 2021	AICTE Suggested for CSE as per 2022	CSE (AIML)
1.	Humanities and Social Sciences including Management Courses	10	16	12
2.	Basic Science Courses	16	23	20
3.	Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer, etc.	08	29	22.5
4.	Professional Core Courses	71	59	64
5.	Professional Elective Courses relevant to chosen Specialization / Branch	16	12	16.5
6.	Open Subjects – Electives from other Technical and/or Emerging Subjects	06	09	12
7.	Project Work, Seminar and Internship in industry or elsewhere	38	15	16
8.	Mandatory Courses (Non-credit) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	(NON-CREDIT)	(NON-CREDIT)	(NON-CREDIT)
	Total	**165**	**163**	**163**
9	Honours Courses (MOOCS or otherwise)	20	20	20
	Grand Total	**185**	**183**	**183**

Definition of Credit (as per AICTE):

- 1 Hour Lecture (L) per Week = 1 Credit
- 1 Hour Tutorial (T) per Week = 1 Credit
- 1 Hour Practical (P) per Week = 0.5 Credits
- 2 Hours Practical (Lab) per Week = 1 Credit

Range of Credits (as per AICTE):

- A total of 163 credits will be necessary for a student to be eligible to get B Tech degree.
- A student will be eligible to get B Tech degree with Honours if he/she completes an additional 20 credits.
- These could be acquired through MOOCs.
- Any student completing any course through MOOC will have to submit an appropriate certificate to earn the corresponding credit.
- For any additional information, the student may contact the concerned HODs.

DETAILED SYLLABUS OF 1ST YEAR

FIRST YEAR
FIRST SEMESTER

Course Title : Physics-I					
Course Code: PHY1001					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**0**	**0**	**3**	**3**

Course Outcome:

After successfully completing this course the students will be able to:

PHY1001.1: Understand physical systems in terms of their modelling of time evolution.

PHY1001.2: Comprehend wave interpretation of natural phenomena and implications of allied observations.

PHY1001.3: Understand theoretical backgrounds associated to some experiments based on wave phenomena.

PHY1001.4: Grasp an analytic view of micro and macroscopic world.

PHY1001.5: Access the knowledge of the behaviour of a particle under the influence of different potential.

PHY1001.6: Understand conservative systems based on their particle and wave nature.

DETAILED SYLLABUS:

Module – I: [10L]

Mechanics:

Plane-polar coordinate system-velocity and acceleration of a particle-trajectory under central force-conservation principle-Kepler's laws -Rotating frame of reference-Five point acceleration formula-Coriolis effect-deflection of a moving particle.

Module – II: [10L]
Oscillation:

Constitutive equation of damping-nature of solutions for large, critical and weak damping-relaxation time, logarithmic decrement, energy decay (qualitative discussion) -Forced oscillation-transient and steady state-amplitude and velocity resonance---power transfer theorem-quality factor-series LCR circuit with AC source.

Module –III: [10L]
Optics:

Plane Progressive Wave-phase/wave-length/frequency-qualitative description of light as an electromagnetic wave-Huygens principle-polarization (state of polarization, general equation of ellipse, transformation of polarized lights)-interference (basic theory from superposition principle)-Division of wave front (Young's double slit experiment)-Division of amplitude (thin film, wedge, Newton's ring)-Diffraction (single slit, double slit, grating, Resolving Power).

Module – IV: [10L]
Quantum Mechanics:

An informal discussion from Planck to de Broglie as the historical context of quantum mechanics-Quantum Mechanics of a particle-operator-eigenvalue problem- Unitary-Hermitian frame work-position and momentum operator-Canonical Commutation Relations (CCR)- Schrodinger equation-time dependent/time independent Schrodinger equation-wave function-stationary states-probability density-probability current density-normalization-expectation value-uncertainty-Bound state problem-particle in a one dimensional box- scattering state problem-potential step-reflection and transmission coefficients- tunnelling.

BOOKS

1. Theoretical Mechanics : M R Spiegel (Schaum Series) McGrow-Hill Book Company
2. Classical Mechanics: N C Rana and P S Joag Tata- McGrow-Hill Publishing Company Limited.
3. Vibrations and Waves : A P French, W W Norton and Company,
4. The Physics of Waves and Oscillations : N K Bajaj, Tata- McGrow-Hill Publishing Company Limited.
5. Optics: A Ghatak, Tata McGraw-Hill Publishing Company Limited.
6. Optics : E. Hecht, Addison Wesley
7. Fundamentals of Optics: F A Jenkins and H E White, McGrow-Hill Higher Education.
8. Atomic Physics (Modern Physics): S N Ghosal, S. Chand and Company.
9. Practical Quantum Mechanics : S Flugge, Springer (Reprint of the 1994 Edition)
10. Concepts of Modern Physics: A Baiser, Tata McGraw-Hill Publishing Company Limited.

Refresher Course in B.Sc. Physics – Vol1 and Vol 2 – C.L.Arora

Course Title : Mathematics-I					
Course Code: MTH1101					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**1**	**0**	**4**	**4**

After successfully completing this course the students will be able to:

MTH1101.1 Apply the concept of rank of matrices to find the solution of a system of linear simultaneous equations.
MTH1101.2 Develop the concept of eigen values and eigen vectors.
MTH1101.3 Combine the concepts of gradient, curl, divergence, directional derivatives, line integrals, surface integrals and volume integrals.
MTH1101.4 Analyze the nature of sequence and infinite series
MTH1101.5 Choose proper method for finding solution of a specific differential equation.
MTH1101.6 Describe the concept of differentiation and integration for functions of several variables with their applications in vector calculus.

Detailed Syllabus:

Module I: [10L]

Matrix: Inverse and rank of a matrix; Elementary row and column operations over a matrix; System of linear equations and its consistency; Symmetric, skew symmetric and orthogonal matrices; Determinants; Eigen values and eigen vectors; Diagonalization of matrices; Cayley Hamilton theorem; Orthogonal transformation.

Module II: [10L]

Vector Calculus: Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions, Gradient of a scalar point function, divergence and curl of a vector point function, Directional derivative, Related problems on these topics.
Infinite Series: Convergence of sequence and series; Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test(statements and related problems on these tests), Raabe's test; Alternating series; Leibnitz's Test (statement, definition); Absolute convergence and Conditional convergence.

Module III: [10L]

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.
Ordinary differential equations of higher orders: General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods, Method of variation of parameters, Cauchy-Euler equations.

Module IV: [10L]

Calculus of functions of several variables: Introduction to functions of several variables with examples, Knowledge of limit and continuity, Determination of partial derivatives of higher orders with examples, Homogeneous functions and Euler's theorem and related problems up to three variables.

Multiple Integration: Concept of line integrals, Double and triple integrals. Green's Theorem, Stoke's Theorem and Gauss Divergence Theorem.

References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2000.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. K. F. Riley, M. P. Hobson, S. J. Bence. Mathematical Methods for Physics and Engineering, Cambridge University Press, 23-Mar-2006.
6. S. L. Ross, Differential Equations", Wiley India, 1984.
7. G.F. Simmons and S.G. Krantz, Differential Equations, McGraw Hill, 2007.
8. Vector Analysis(Schaum's outline series): M. R. Spiegel, Seymour Lipschutz, Dennis Spellman (McGraw Hill Education)
9. Engineering Mathematics: S. S. Sastry (PHI)
10. Advanced Engineering Mathematics: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP),Indian Edition.
11. Linear Algebra (Schaum's outline series): Seymour Lipschutz, Marc Lipson (McGraw Hill Education)

Course Title : Introduction to Electronics Devices & Circuits					
Course Code: ECE1001					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**0**	**0**	**3**	**3**

Course Outcomes:

After going through this course, the students will be able to:

ECE1001.1 Categorize different semiconductor materials based on their energy bands and analyze the change in characteristics of those materials due to different types of doping.

ECE1001.2 Describe energy band of P-N Junction devices and solve problems related to P-N Junction Diode.

ECE1001.3 Design different application specific circuits using diodes.

ECE1001.4 Analyze various biasing configurations of Bipolar Junction Transistor.

ECE1001.5 Categorize different field-effect transistors and analyze their behavior.

ECE1001.6 Design and implement various practical electronic circuits.

Module I [10 L]

Basic Semiconductor Physics:

Crystalline materials, energy band theory, Conductors, Semiconductors and Insulators, Concept of Fermi energy level, intrinsic and extrinsic semiconductors, mass action law, drift and diffusion currents in semiconductor, Einstein relation.

Diodes and Diode Circuits:

Formation of p-n junction, energy band diagram, forward & reverse biased configurations, V-I characteristics, DC load line, breakdown mechanisms - Zener and avalanche breakdown, voltage regulation using Zener diode.

Rectifier circuits: half wave & full wave rectifiers: ripple factor, rectification efficiency, light emitting diode.

Module II [8 L]

Bipolar Junction Transistors (BJT):

PNP & NPN BJT structures, different operating modes of BJT, current components in BJT, dc current gains in CE & CB configurations and their interrelation, input & output V-I characteristics of CE & CB configurations. Concept of Biasing: DC load line, Q-point, basic concept of amplification using BJT.

Module III [9 L]

Field Effect Transistors (FET):

Classification of FET, basic structure and operation of Junction Field Effect Transistor (n-channel)along with its V-I characteristics.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Enhancement & depletion type MOSFETs (forboth n & p channel devices), drain & transfer characteristics.

Module IV [9 L]

Feedback in amplifiers:

Concept of feedback, different feedback topologies using block diagram only, effects of negative feedback

(qualitative), Barkhausen criteria for sustained oscillation.

Operational Amplifier:

Usefulness of differential amplifier over single ended amplifier, ideal OPAMP characteristics, CMRR, slew rate, offset error voltages and current

Basic circuits using OPAMP: Comparator, inverting and non-inverting amplifiers, adder, subtractor, integrator, differentiator.

References:

1. Boylestad&Nashelsky:Electronic Devices & Circuit Theory
2. R.A Gayakwad: Op Amps and Linear IC's, PHI
3. D. Chattopadhyay, P. C Rakshit : Electronics Fundamentals and Applications
4. Adel S. Sedra, Kenneth Carless Smith: Microelectronics Engineering
5. Millman & Halkias: Integrated Electronics.
6. Salivahanan: Electronics Devices & Circuits.
7. Albert Paul Malvino: Electronic Principle.

Course Name: **Universal Human Values and Professional Ethics**					
Course Code : HUM1002					
Contact Hours per week	**L**	**T**	**P**	**Total**	**Credit Points**
	2	1	0	3	3

COURSE OUTCOMES:

The students will be able to:

HUM1002.1 aware of the value system and the importance of following such values at workplace
HUM1002.2 learn to apply ethical theories in the decision making process
HUM1002.3 follow the ethical code of conduct as formulated by institutions and organizations
HUM1002.4 Implement the principles governing work ethics
HUM1002.5 Develop strategies to implement the principles of sustainable model of development
HUM1002.6 Implement ecological ethics wherever relevant and also develop eco-friendly technology

Module I [10 L]

Human society and the Value System

Values: Definition, Importance and application. Formation of Values: The process of Socialization

Self and the integrated personality Morality, courage, integrity

Types of Values:

Social Values: Justice, Rule of Law, Democracy, Indian Constitution, Secularism Aesthetic Values: Perception and appreciation of beauty

Organizational Values: Employee: Employer--- rights, relationships, obligations Psychological Values: Integrated personality and mental health

Spiritual Values &their role in our everyday life

Value Spectrum for a Good Life, meaning of Good Life

Value Crisis in Contemporary Society

Value crisis at----

Individual Level Societal Level Cultural Level

Value Crisis management Strategies and Case Studies

Module II [10L]

Ethics and Ethical Values Principles and theories of ethics

Consequential and non-consequential ethics

Egotism, Utilitarianism, Kant's theory and other non-consequential perspectives Ethics of care, justice and fairness, rights and duties

Ethics--

Standardization Codification Acceptance Application

Types of Ethics- Ethics of rights and Duties

Ethics of Responsibility Ethics and Moral judgment Ethics of care

Ethics of justice and fairness

Work ethics and quality of life at work

Professional Ethics

Ethics in Engineering Profession;

Moral issues and dilemmas, moral autonomy (types of inquiry) Kohlberg's theory, Gilligan's theory (consensus and controversy)

Code of Professional Ethics Sample Code of ethics like ASME, ASCE. IEEE Institute of Engineers, Indian Institute of materials management, Institute of Electronics and telecommunication engineers

Violation of Code of Ethics---conflict, causes and consequences

Engineering as social experimentation, engineers as responsible experimenters (computer ethics, weapons development)

Engineers as managers, consulting engineers, engineers as experts, witnesses and advisors, moral leadership Conflict between business demands and professional ideals

Social and ethical responsibilities of technologies.

Whistle Blowing: Facts, contexts, justifications and case studies

Ethics and Industrial Law

Institutionalizing Ethics: Relevance, Application, Digression and Consequences

Module III [10L]

Science, Technology and Engineering

Science, Technology and Engineering as knowledge and profession

Definition, Nature, Social Function and Practical application of science Rapid Industrial Growth and its Consequences

Renewable and Non- renewable Resources: Definition and varieties Energy Crisis

Industry and Industrialization Man and Machine interaction

Impact of assembly line and automation Technology assessment and Impact analysis Industrial hazards and safety

Safety regulations and safety engineering Safety responsibilities and rights

Safety and risk, risk benefit analysis and reducing risk Technology Transfer: Definition and Types

The Indian Context

Module IV [6L]

Environment and Eco- friendly Technology

Human Development and Environment Ecological Ethics/Environment ethics

Depletion of Natural Resources: Environmental degradation Pollution and Pollution Control

Eco-friendly Technology: Implementation, impact and assessment

Sustainable Development: Definition and Concept

Strategies for sustainable development Sustainable Development--- The Modern Trends

Appropriate technology movement by Schumacher and later development Reports of Club of Rome.

Suggested Readings:

1. Tripathi,A.N., Human Values, New Age International, New Delhi,2006
2. Ritzer, G., Classical Sociological Theory, The McGraw Hill Companies, New York,1996. 3)Doshi,S.L., Postmodern Perspectives on Indian Society, Rawat Publications, New Delhi,2008. 4)Bhatnagar, D.K., Sustainable Development, Cyber Tech Publications, New Delhi, 2008. 5)Kurzwell,R., The age of Spiritual Machines, Penguin Books, New Delhi,1999.
3. Weinberg, S.K., Social Problems in Modern Urban Society, Prentice Hall,Inc.,USA, 1970.
4. Giddens, Anthony 2009. Sociology. London: Polity Press (reprint 13th Edition).

Course Title : Physics-I Lab					
Course Code: PHY1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**2**	**2**	**1**

Course Outcomes:

PHY1051.1: Applying practical knowledge using the experimental methods to correlate with the Physics theory.

PHY1051.2: Understanding the usage of electrical and optical systems for various measurements.

PHY1051.3: Applying the analytical techniques and graphical analysis to the experimental data.

PHY1051.4: Understanding measurement technology, usage of new instruments and real time applications in engineering studies.

PHY1051.5: Evaluating intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Minimum of six experiments taking at least one from each of the following four groups:

Group I: Experiments in Optics

1. Determination of dispersive power of the material of a prism

2. Determination of wavelength of a monochromatic light by Newton's ring

3. Determination of wavelength of the given laser source by diffraction method

Group II: Electricity & Magnetism experiments

1. Determination of specific charge (e/m) of electron by J.J. Thompson's method.

2. Determination of dielectric constant of a given dielectric material.

3. Determination of Hall coefficient of a semiconductor by four probe method.

4. To study current voltage characteristics, load response, areal characteristic and spectral response of a photovoltaic solar cell.

5. Determination of Magnetic Field Measurement for a current carrying coil.

6. Determination of unknown resistance using Carey Foster's bridge

Group III: Experiments in Quantum Physics

1. Determination of Stefan-Boltzmann constant.

2. Determination of Planck constant using photocell.

3. Determination of Lande-g factor using Electron spin resonance spectrometer.

4. Determination of Rydberg constant by studying Hydrogen spectrum.

5. Determination of Band gap of semiconductor.

Group IV: Miscellaneous experiments

1. Determination of Young's modulus of elasticity of the material of a bar by the method of flexure

2. Determination of bending moment and shear force of a rectangular beam of uniform cross section

3. Determination of modulus of rigidity of the material of a rod by static method

4. Determination of rigidity modulus of the material of a wire by dynamic method

5. To determine the moment of inertia of a body about an axis passing through its centre of gravity and to determine the modulus of rigidity of the material of the suspended wire

6. Determination of coefficient of viscosity by Poiseulle's capillary flow method

Books of reference:

1. Optics – Eugene Hecht Pearson Education India Private Limited
2. Introduction to Electrodynamics, David J. Griffiths, Pearson Education India Learning Private Limited
3. Waves and Oscillations by N.K. Bajaj
4. Principles of Physics, 10ed, David Halliday, Robert ResnickJearl Walker , Wiley
5. Electricity, Magnetism, and Light, Wayne M. Saslow, Academic Press
6. Classical mechanics, Narayan Rana, PramodJoag, McGraw HillEducation
7. Introduction to Classical Mechanics, R Takwale, P Puranik, McGraw Hill Education
8. Optics, Ghatak, McGraw Hill Education India Private Limited
9. Refresher Course in B.Sc. Physics – Vol1 and Vol 2 – C.L.Arora

Course Title : Introduction to Electronics Devices & Circuits Lab					
Course Code: ECE1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**2**	**2**	**1**

Course Outcomes:

ECE1051.1 The students will correlate theory with diode behavior.
ECE1051.2 They will design and check rectifier operation with regulation etc.
ECE1051.3 Students will design different modes with BJT and FET and check the operations.
ECE1051.4 They will design and study adder, integrator etc. with OP-AMPs.

List of Experiments

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multi-metersetc.
2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs in CB mode
7. Study of I-V characteristics of BJTs in CE mode
8. Study of I-V characteristics of Field Effect Transistors.
9. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
10. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
11. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.

Course Title : Workshop/Manufacturing Practices					
Course Code: MEC1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	1	**0**	**3**	**4**	**2.5**

Course Outcomes:

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

MEC1051.1: **Follow** the various safety practices in workshop and personal protective elements.

MEC1051.2: **Identify** tools, work material and measuring instruments useful for fitting, carpentry and sheet metal practices.

MEC1051.3: **Operate** machine tools, components and processes to prepare jobs of specific shape and size.

MEC1051.4: **Acquire** knowledge of foundry process and casting of a product.

MEC1051.5: **Perform** welding, brazing and soldering processes.

MEC1051.6: **Assemble** a simple product.

Syllabus:

(i) Lectures: (13 hours)

Detailed contents

1. Introduction on Workshop and familiarization with safety norms	**(1 lecture)**
2. Carpentry and Fitting	**(2 lectures)**
3. Sheet metal	**(1 lecture)**
4. Metal casting	**(1 lecture)**
5. Welding (arc welding & gas welding), brazing and soldering	**(2 lectures)**
6. Manufacturing Methods- machining (Lathe, Shaping and Milling)	**(4 lectures)**
7. Additive manufacturing	**(1 lecture)**
8**.** Assembling of a product	**(1 lecture)**

(ii) Workshop Practice:(39 hours)

1. Safety practices in workshop	**(3 hours)**
2. Carpentry shop	**(3 hours)**
3. Fitting shop	**(6 hours)**
4. Foundry shop	**(3 hours)**
5. Machine shop	**(9 hours)**
6. Welding shop-Arc welding	**(3 hours)**
7. Sheet metal shop and brazing	**(6 hours)**
8. Soldering operation	**(3 hours)**
9**.** Assembling of a product	**(3 hours)**

Suggested Text/Reference Books:

1. HajraChoudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K., "Elements ofWorkshop Technology", Vol. I 2008 and Vol. II 2010, Media promotersandpublishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" PearsonEducation, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice HallIndia, 1998.
5. 5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House,2017.

Course Title : Engineering Graphics and Design					
Course Code: MEC1052					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	1	**0**	**3**	**4**	**2.5**

Course Outcomes:

After going through the course, the students will be able

MEC1052.1 To understand the meaning of engineering drawing.

MEC1052.2 To have acquaintance with the various standards (like lines, dimensions, scale etc.) and symbols followed in engineering drawing.

MEC1052.3 To represent a 3-D object into 2-D drawing with the help of orthographic and isometric projections.

MEC1052.4 To read and understand projection drawings.

MEC1052.5 To draw the section view and true shape of a surface when a regular object is cut by a section plane.

MEC1052.6 To use engineering drawing software (CAD).

Lecture Plan (13 L)

1. Importance and principles of engineering drawing (1 L)
2. Concepts of Conic sections and Scale (1 L)
3. Introduction to concept of projection (Projections of points, lines and surfaces) (4 L)
4. Definitions of different solids and their projections (1 L)
5. Section of solids and sectional view (1 L)
6. Isometric projection (2 L)
7. Introduction to CAD (2 L)
8. Viva Voce (1 L)

Detailed contents of Lab hours (52 hrs)

Module 1: Introduction to Engineering Drawing covering,

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lines, lettering & dimensioning, Conic section like Ellipse (General method only); Involute; Scales – Plain, Diagonal. (4 hrs + 4 hrs)

Module 2: Orthographic Projections covering,

Principles of Orthographic Projections - Conventions - Projections of Points and lines inclined to both planes; Projections on Auxiliary Planes. Projection of lamina.

(4 hrs+4 hrs + 4 hrs)

Module 3: Projections of Regular Solids covering,those inclined to both the Planes- Auxiliary Views.

(4 hrs + 4 hrs)

Module 4: Sections and Sectional Views of Right Angular Solids covering,

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids.(4 hrs)

Module 5: Isometric Projections covering,

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions. (4 hrs + 4 hrs)

Module 6: Overview of Computer Graphics covering,

listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids. (4 hrs)

Module 7: Customisation & CAD Drawing

consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles; (2 hrs)

Annotations, layering & other functions covering

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation. (2 hrs)

Module 8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame.

(4 hrs)

References:

1. Bhatt, N.D., Panchal V.M. & Ingle P.R., (2014) "Elementary Engineering Drawing"; Charotan Publishing House
2. Narayana, K.L. and Kannaaiah P "Engineering Graphics"; TMH
3. Lakshminarayanan, V. and VaishWanar, R.S "Engineering Graphics" Jain Brothers.
4. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Edication.
5. Agarwal B. &Agarwal C. M. (2012), Engineering graphics, TMH Publications.

FIRST YEAR
SECOND SEMESTER

Course Title : Chemistry-I					
Course Code : CHM1001					
Contact hrs. per week:	L	T	P	Total	Credit points
	3	0	0	3	3

Course outcomes:

The subject code CHM 1001 corresponds to chemistry theory classes for the first year B. Tech students, which is offered as Engineering Chemistry and is common for all branches of engineering subjects. The course provides basic knowledge of theory based subjects like quantum mechanics, thermodynamics, reaction dynamics, electrochemistry, structure and reactivity of molecules. The course outcomes of the subject are

CHM1001.1 Knowledge of understanding the operating principles and reaction involved in batteries and fuel cells and their application in automobiles as well as other sectors to reduce environmental pollution.

CHM1001.2 An ability to design and conduct experiments, as well as to organize, analyzes, and interprets data.

CHM1001.3 An ability to analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces for engineering applications.

CHM1001.4 Have knowledge of synthesizing nano materials and their applications in industry, carbon nano tube technology is used in every industry now-a-days.

CHM1001.5 Understanding of bulk properties and processes using thermodynamic considerations.

CHM1001.6 Elementary knowledge of IR, UV, NMR and X-ray spectroscopy is usable in structure elucidation and characterisation of various molecules.Knowledge of electronic effect and stereochemistry for understanding mechanism of the major chemical reactions involved in synthesis of various drug molecules.

MODULE 1[10 L]

Atomic structure and Wave Mechanics:

Brief outline of the atomic structure, Duel character of electron, De Broglies's equation, the Heisenberg uncertainty principle, brief introduction of quantum mechanics, the Schrodinger wave equation, Hermitian operator, solution of the Schrodinger equation for particle in a one dimensional box, interpretation of the wave function Ψ, concept of atomicorbital. 3L

Thermodynamics:

Carnot cycle, 2nd law of thermodynamics, entropy, Clausius inequality, free energy and work function, ClausiusClapeyron Equation, Chemical Potential, Activity and Activity coefficient. Gibbs Duhem Relation.4L

Spectroscopic Techniques & Application

Electromagnetic spectrum: EMR interaction with matter - absorption and emission of radiation. Principle and application of UV- visible and IR spectroscopy

Principles of NMR Spectroscopy and X-ray diffraction technique. 3L

MODULE 2 [10 L]

Chemical Bonding

Covalent bond, VSEPR Theory, hybridization, molecular geometries, Dipole moment, Intermolecular forces, V.B. and M.O. theory and its application in Homo and Heteronuclear diatomic molecules, Band theory of solids, Pi- molecular orbital of ethylene and butadiene.5L

Periodicity

Effective nuclear charge, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro-negativity, inert pair effect.3L

Ionic Equilibria

Acid Base Equilibria, Salt Hydrolysis and Henderson Equation, Buffer solutions, pH indicator, Common ion Effect, Solubility product, Fractional Precipitation .2L

MODULE 3 [10 L]

Conductance

Conductance of electrolytic solutions, Strong and Weak electrolytes, effect of temperature and concentration.Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions.Application of conductance Acid-base and precipitation titration. 3L

Electrochemical Cell

Thermodynamic derivation of Nernst equation, Electrode potential and its application to predict redox reaction; Standard Hydrogen Electrode, Reference electrode, cell configuration, half-cell reactions, evaluation of thermodynamic functions; Reversible and Irreversible cells; Electrochemical corrosion.

Electrochemical Energy Conversion: Primary & Secondary batteries, Fuel Cells. 4L

Reaction dynamics

Rate Laws, Order &Molecularity; zero, first and second order kinetics.Pseudo-unimolecular reaction, Arrhenius equation.

Mechanism and theories of reaction rates (Transition state theory, Collison theory). Catalysis: Homogeneous catalysis (Definition, example, mechanism, kinetics). 3L

MODULE 4 [10]

Stereochemistry

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.4L

Structure and reactivity of Organic molecule

Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion, free radicals, aromaticity.3L

Organic reactions and synthesis of drug molecule

Introduction to reaction mechanisms involving substitution, addition, elimination and oxidation- reduction reactions. Synthesis of commonly used drug molecules.3L

TEXT BOOKS

1. Atkins' Physical Chemistry, P.W. Atkins (10th Edition)
2. Organic Chemistry, I. L. Finar, Vol-1 (6th Edition)
3. Engineering Chemistry, Jain & Jain,(16th Edition)
4. Fundamental Concepts of Inorganic Chemistry, A. K. Das, (2nd Edition)
5. Engineering Chemistry -I, GourkrishnaDasmohapatra, (3rd Edition)

REFERENCE BOOKS

1. General & Inorganic Chemistry, R. P. Sarkar
2. Physical Chemistry, P. C. Rakshit, (7th Edition)
3. Organic Chemistry, Morrison & Boyd , (7th Edition)
4. Fundamentals of Molecular Spectroscopy, C.N. Banwell, (4th Edition)
5. Physical Chemistry , G. W. Castellan, (3rd Edition)
6. Basic Stereo chemistry of Organic Molecules, SubrataSen Gupta, (1st Edition)

Course Title: Mathematics-II					
Course Code: MTH1201					
Contact Hours per week	**L**	**T**	**P**	**Total**	**Credit Points**
	3	1	0	4	4

Course Outcomes

MTH1201.1. Demonstrate the knowledge of probabilistic approaches to solve wide range of engineering problem.

MTH1201.2. Recognize probability distribution for discrete and continuous variables to quantify physical and engineering phenomenon.

MTH1201.3. Develop numerical techniques to obtain approximate solutions to mathematical problems where analytical solutions are not possible to evaluate.

MTH1201.4. Analyze certain physical problems that can be transformed in terms of graphs and trees and solving problems involving searching, sorting and such other algorithms.

MTH1201.5. Apply techniques of Laplace Transform and its inverse in various advanced engineering problems.

MTH1201.6. Interpret differential equations and reduce them to mere algebraic equations using Laplace Transform to solve easily.

The objective of this course is to familiarize the students with numerical techniques, integral transforms, graph theory and probability. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Module-I Fundamentals of Probability [10L]

Random experiment, Sample space and events

Classical and Axiomatic definition of probability

Addition and Multiplication law of probability

Conditional probability

Bayes' Theorem

Random variables

General discussion on discrete and continuous distributions

Expectation and Variance

Examples of special distribution: Binomial and Normal Distribution

Module-II Numerical Methods [10L]

Solution of non-linear algebraic and transcendental equations: Bisection Method, Newton-Raphson Method, Regula-Falsi Method.

Solution of linear system of equations: Gauss elimination method, Gauss-Seidel Method, LU Factorization Method, Matrix Inversion Method.

Solution of Ordinary differential equations: Euler's and Modified Euler's Method ,Runge-Kutta Method of 4th order.

Module-III Basic Graph Theory [10L]

Graphs: Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph

Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices

Matrix representation of a graph, Adjacency and incidence matrices of a graph

Graph isomorphism

Bipartite graph

Definition and properties of a tree

Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees

Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms

Module-IV Laplace Transformation [10L]

Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations.

Introduction to integral transformation

Functions of exponential order, Definition and existence of Laplace Transform(LT) (statement of initial and final value theorem only)

LT of elementary functions, Properties of Laplace Transformations , Evaluation of sine , cosine and exponential integrals using LT

LT of periodic and step functions

Definition and properties of inverse LT

Convolution Theorem (statement only) and its application to the evaluation of inverse LT

Solution of linear ODEs with constant coefficients (initial value problem) using LT

Suggested Books:

1. Advanced Engineering Mathematics , E.Kreyszig, Wiley Publications
2. Introduction to Probability and Statistics for Engineers and Scientists, S.Ross, Elsevier
3. Introductory methods of Numerical Analysis, S.S. Sastry, PHI learning
4. Introduction to Graph Theory, D. B. West, Prentice-Hall of India
5. Engineering Mathematics, B.S. Grewal, S. Chand & Co.

Course Title: Programming for Problem Solving					
Course Code: CSE1001					
Contact Hours per week	**L**	**T**	**P**	**Total**	**Credit Points**
	4	0	0	4	4

Course Outcomes:

After completion of the course, students will be able to:

CSE1001.1: Remember and understand the functionalities of the different hardware and software components present in a computer system, the standard representations of various types of data in a computer system.

CSE1001.2: Illustrate how a computer system with one way of representation can be converted to one another equivalent representation.

CSE1001.3: Construct flow charts for any arithmetic or logical problems in hand.

CSE1001.4: Remember and understand the C programming development environment, writing, compiling, debugging, linking and executing a C program using that development environment, basic syntax and semantics of C programming language and interpret the outcome of any given C program.

CSE1001.5: Use loop constructs, conditional branching, iteration, recursion to solve simple engineering problems.

CSE1001.6: Apply pointers, arrays, structures, files to formulate simple engineering problems.

Learning Objectives: Introduction to the concept of computer and computation and solving of problems using C as a programming language. Coverage of C will include basic concepts, arithmetic and logic, flow control, and data handling using arrays, structures, pointers and files.

Module I: [10L] Fundamentals of Computer

History of Computers, Generations of Computers, Classification of Computers.

Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices. Basic Concepts of Assembly language, High level language, Compiler and Assembler.

Binary & Allied number systems (decimal, octal and hexadecimal) with signed and unsigned numbers (using 1's and 2's complement) - their representation, conversion and arithmetic

operations. Packed and unpacked BCD system, ASCII. IEEE-754 floating point representation (half- 16 bit, full- 32 bit, double- 64 bit).

Basic concepts of operating systems like MS WINDOWS, LINUX How to write algorithms & draw flow charts.

Module II: [10L] Basic Concepts of C

C Fundamentals:

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements. Operators & Expressions:

Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Standard input and output, formatted output -- printf, formatted input scanf.

Flow of Control:

Statement and blocks, if-else, switch-case, loops (while, for, do-while), break and continue, go to and labels.

Module III: [10L]

Program Structures in C

Basic of functions, function prototypes, functions returning values, functions not returning values. Storage classes -

auto, external, static and register variables – comparison between them. Scope, longevity and visibility of variables.C preprocessor (macro, header files), command line arguments.

Arrays and Pointers:

One dimensional arrays, pointers and functions – call by value and call by reference, array of arrays. Dynamic memory usage– using malloc(), calloc(), free(), realloc(). Array pointer duality.

String and character arrays; C library string functions and their use.

Module IV: [10L]

Data Handling in C

User defined data types and files:

Basic of structures; structures and functions; arrays of structures.

Files – text files only, modes of operation. File related functions – fopen(), fclose(), fscanf(), fprintf(), fgets(), fputs(), fseek(), ftell();

Text Books

1. Schaum's outline of Programming with C – Byron Gottfried
2. Teach Yourself C- Herbert Schildt
3. Programming in ANSI C – E Balagurusamy

Reference Books

1. C: The Complete Reference – Herbert Schildt
2. The C Programming Language- D.M.Ritchie, B.W. Kernighan

Course Title: Basic Electrical Engineering					
Course Code: ELE1001					
Contact Hours per week	**L**	**T**	**P**	**Total**	**Credit Points**
	3	1	0	4	4

Course Outcomes

After attending the course, the students will be able to

ELE1001.1 Analyse DC electrical circuits using KCL, KVL and network theorems like Superposition Theorem, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem.

ELE1001.2 Analyse DC Machines; Starters and speed control of DC motors.

ELE1001.3 Analyse magnetic circuits.

ELE1001.4 Analyse single and three phase AC circuits.

ELE1001.5 Analyse the operation of single phase transformers.

ELE1001.6 Analyse the operation of three phase induction motors.

Module-I: [11 L]

DC Network Theorem: Kirchhoff's laws, Nodal analysis, Mesh analysis, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Star-Delta conversion. [6L]

Electromagnetism: Review of magnetic flux, Force on current carrying conductors, Magnetic circuit analysis, Self and Mutual inductance, B-H loop, Hysteresis and Eddy current loss, Lifting power of magnet. [5L]

Module-II[10L]

AC single phase system: Generation of alternating emf, Average value, RMS value, Form factor, Peak factor, representation of an alternating quantity by a phasor, phasor diagram, AC series, parallel and series-parallel circuits, Active power, Reactive power, Apparent power, power factor, Resonance in RLC series and parallel circuit.

Module-III [11 L]

Three phase system: Generation of three-phase AC power, Balanced three phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams, power measurement by two wattmeter method. [4L]

DC Machines: Construction, EMF equation, Principle of operation of DC generator, Open circuit characteristics, External characteristics, Principle of operation of DC motor, speed-torque characteristics of shunt and series machine, starting of DC motor, speed control of DC motor.[7L]

Module-IV [10L]

Transformer: Construction, EMF equation, no load and on load operation and their phasor diagrams, Equivalent circuit, Regulation, losses of a transformer, Open and Short circuit tests, Efficiency, Introduction to three phase transformer.[6L]

Three-phase induction motor: Concept of rotating magnetic field, Principle of operation, Construction, Equivalent circuit and phasor diagram, torque-speed/slip characteristics, Starting of Induction Motor.[4L]

Text Books:

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Basic Electrical Engineering, V.N Mittle&Arvind Mittal, TMH, Second Edition
3. Basic Electrical Engineering, Hughes
4. Electrical Technology, Vol-I,Vol-II,Surinder Pal Bali, Pearson Publication
5. A Text Book of Electrical Technology, Vol. I & II, B.L. Theraja, A.K. Theraja, S.Chand& Company

Reference Books:

1. Electrical Engineering Fundamentals, Vincent Del Toro, Prentice-Hall
2. Advance Electrical Technology, H.Cotton, Reem Publication
3. Basic Electrical Engineering, R.A. Natarajan, P.R. Babu, Sictech Publishers
4. Basic Electrical Engineering, N.K. Mondal, DhanpatRai
5. Basic Electrical Engineering, Nath&Chakraborti
6. Fundamental of Electrical Engineering, Rajendra Prasad, PHI, Edition 2005.

Course Title: English for Technical Writing					
Course Code: HUM1001					
Contact Hours per week	**L**	**T**	**P**	**Total**	**Credit Points**
	2	0	0	2	2

Course Outcome:

Students will be able to

HUM1001.1: Communicate effectively in an official and formal environment

HUM1001.2: Use language as a tool to build bridges and develop interpersonal relations in multi-cultural environment

HUM1001.3: Use various techniques of communication for multiple requirements of globalized workplaces

HUM1001.4: Learn to articulate opinions and views with clarity.

HUM1001.5: Write business letters and reports.

HUM1001.6: Apply various communication strategies to achieve specific communication goals.

Module- I (6hrs.)

Introduction to Phonology and Morphology

- Phonetics- Vowel and Consonant Sounds (Identification & Articulation)
- Word- stress, stress in connected speech
- Intonation (Falling and Rising Tone)
- Vocabulary Building-The concept of Word Formation

Module- II (6hrs.)

Communication Skills

- The Basics of Business Communication- Process, types, levels
- Barriers to Communication Common obstacles to effective communication
- Approaches and Communication techniques for multiple needs at workplace: persuading, convincing, responding, resolving conflict, delivering bad news, making positive connections
- Identify common audiences and design techniques for communicating with each audience

Module- III (6hrs.)

Organizational Communication

- Business Letters
- Organizational Communication: Agenda & minutes of a meeting, Notice, Memo, Circular
- Organizing e-mail messages, E-mail etiquette
- Techniques for writing precisely: Creating coherence, organizing principles –accuracy, clarity, brevity. Different styles of writing: descriptive, narrative, expository.

Module- IV (6hrs.)

Principles, techniques and skills for professional writing

- Logic in writing, thinking and problem-solving; applying deductive and inductive reasoning; Use of infographics in writing.
- Report Writing: Importance and Purpose, Types of Reports, Report Formats, Structure of Formal Reports, Writing Strategies. Interpreting data and writing reports
- Writing proposals and Statement of purpose

Text Books:

1 Kumar,S. &Lata, P. Communication Skills, OUP, New Delhi2011

2 Rizvi,Ashraf,M. Effective Technical Communication, McGraw Hill Education(India) Pvt. Ltd..Chennai,2018

3 Raman, M. and Sharma, S., Technical Communication: Principles and Practice, 2nd Ed., 2011

Reference Books:

1. Professional Writing Skills, Chan, Janis Fisher and Diane Lutovich. San Anselmo, CA: Advanced Communication Designs.
2. Hauppauge, Geffner, Andrew P. Business English, New York: Barron's Educational Series.

Course Title : Chemistry-I Lab					
Course Code : CHM1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**2**	**2**	**1**

Course outcomes:

The subject code CHM1051 corresponds to chemistry laboratory classes for the first year B. Tech students. This course enhances the students' experience regarding handling of various chemicals along with various laboratory equipment. Hands on experiments increase the depth of knowledge that is taught in the theory classes as well as it increases research aptitude in students because they can see the direct application of theoretical knowledge in practical field. The course outcomes of the subject are

CHM1051.1 Knowledge to estimate the hardness of water which is required to determine the usability of water used in industries.

CHM1051.2 Estimation of ions like Fe^{2+}, Cu^{2+} and Cl^{-} present in water sample to know the composition of industrial water.

CHM1051.3 Study of reaction dynamics to control the speed and yield of various manufactured goods produced in polymer, metallurgical and pharmaceutical industries.

CHM1051.4 Handling physico-chemical instruments like viscometer, stalagmometer, pH-meter, potentiometer and conductometer.

CHM1051.5 Understanding the miscibility of solutes in various solvents required in paint, emulsion, biochemical and material industries.

CHM1051.6 Knowledge of sampling water can be employed for water treatment to prepare pollution free water.

List of Experiments:

1. Estimation of iron using KMnO4: self indicator.
2. Iodometric estimation of Cu^{2+}.
3. Determination of Viscosity.
4. Determination of surface tension.
5. Adsorption of acetic acid by charcoal.
6. Potentiometric determination of redox potentials.
7. Determination of total hardness and amount of calcium and magnesium separately in a given water sample.
8. Determination of the rate constant for acid catalyzed hydrolysis of ethylacetate.
9. Heterogeneous equilibrium (determination of partition coefficient of acetic acid in n-butanol and water mixture).
10. Conductometric titration for the determination of strength of a given HCl solution against a standard NaOH solution.
11. pH-metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
12. Determination of chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

Course Title : Programming for Problem Solving Lab					
Course Code : CSE1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**3**	**3**	**1.5**

Course Outcomes:

After completion of this course the students should be able to:

CSE1051.1 write simple programs relating to arithmetic and logical problems.
CSE1051.2 interpret, understand and debug syntax errors reported by the compiler.
CSE1051.3 implement conditional branching, iteration (loops) and recursion.
CSE1051.4 decompose a problem into modules (functions) and amalgamating the modules to generate a complete program.
CSE1051.5 use arrays, pointers and structures effectively in writing programs.
CSE1051.6 create, read from and write into simple text files.

Software to be used: GNU C Compiler (GCC) with LINUX NB: Cygwin (Windows based) may be used in place of LINUX

Topic 1: LINUX commands and LINUX based editors

Topic 2: Basic Problem Solving

Topic 3: Control Statements (if, if-else, if-elseif-else, switch-case)

Topic 4: Loops - Part I (for, while, do-while)

Topic 5: Loops - Part II

Topic 6: One Dimensional Array

Topic 7: Array of Arrays

Topic 8: Character Arrays/ Strings Topic

Topic 9: Basics of C Functions

Topic 10: Recursive Functions

Topic 11: Pointers

Topic 12: Structures

Topic 13: File Handling

Text Books

1. Schaum's outline of Programming with C – Byron Gottfried
2. Teach Yourself C- Herbert Schildt
3. Programming in ANSI C – E Balagurusamy

Course Title : Basic Electrical Engineering Lab					
Course Code : ELE1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**2**	**2**	**1**

Course Outcomes: The students are expected to

ELE1051.1 Get an exposure to common electrical apparatus and their ratings.

ELE1051.2 Make electrical connections by wires of appropriate ratings.

ELE1051.3 Understand the application of common electrical measuring instruments.

ELE1051.4 Understand the basic characteristics of different electrical machines.

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. Verification of Thevenin's& Norton's theorem.
4. Verification of Superposition theorem
5. Verification of Maximum Power Transfer theorem
6. Calibration of ammeter and voltmeter.
7. Open circuit and Short circuit test of a single phase Transformer.
8. Study of R-L-C Series / Parallel circuit
9. Starting and reversing of speed of a D.C. shunt Motor
10. Speed control of DC shunt motor.
11. No load characteristics of D.C shunt Generators
12. Measurement of power in a three phase circuit by two wattmeter method.

Course Title : English for Technical Writing Lab					
Course Code : HUM1051					
Contact hrs. per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	**0**	**2**	**2**	**1**

Course Outcome: Students will be able to

HUM1051.1 Communicate in an official and formal environment.
HUM1051.2 Effectively communicate in a group and engage in relevant discussion.
HUM1051.3 Engage in research and prepare presentations on selected topics.
HUM1051.4 Understand the dynamics of multicultural circumstances at workplace and act accordingly.
HUM1051.5 Organize content in an attempt to prepare official documents.
HUM1051.6 Appreciate the use of language to create beautiful expressions

Detailed Syllabus

Module- I (6hrs.)

The Art of Speaking

- Techniques for Effective Speaking
- Voice Modulation: Developing correct tone
- Using correct stress patterns: word stress, primary stress, secondary stress. Rhythm in connected speech
- Encoding Meaning Using Nonverbal Symbols,
- How to Improve Body Language
- Eye Communication, Facial Expression, Dress and Appearance
- Posture and Movement, Gesture, Paralanguage
- Encoding meaning using Verbal symbols: How words work and how to use words
- Volume, Pace, Pitch and Pause
- Structuring content for delivery in accordance with time, platform, and audience.

Module- II (6hrs)

Group Discussion

- Nature and purpose and characteristics of a successful Group Discussion
- Group discussion Strategies: Getting the GD started, contributing systematically, moving the discussion along, promoting optimal participation, Handling conflict, Effecting closure

Module- III (6hrs)

- Interviewing
  Types of Interviews, Format for Job Interviews: One-to-one and Panel Interviews, Telephonic Interviews, Interview through video conferencing.
- Cover Letter & CV
- Interview Preparation Techniques, Frequently Asked Questions, Answering Strategies, Dress Code, Etiquette, Questions for the Interviewer, Simulated Interviews.

Module- IV (6hrs.)

Professional Presentation Skills

- Nature and Importance of Presentation skills
- Planning the Presentation: Define the purpose, analyze the Audience, Analyze the occasion and choose a suitable title.
- Preparing the Presentation: The central idea, main ideas, collecting support material, plan visual aids, design the slides
- Organizing the Presentation: Introduction-Getting audience attention, introduce the subject, establish credibility, preview the main ideas, Body-develop the main idea, present information sequentially and logically, Conclusion-summaries, re-emphasize, focus on the purpose, and provide closure.
- Improving Delivery: Choosing Delivery methods, handling stage fright
- Post-Presentation discussion: Handling Questions-opportunities and challenges.

References:

1. Carter, R. And Nunan, D. (Eds), The Cambridge guide to Teaching English to Speakers of Other Languages, CUP, 2001
2. Edward P. Bailey, Writing and Speaking At Work: A Practical Guide for Business Communication, Prentice Hall, 3rd Ed., 2004
3. Munter, M., Guide to Managerial Communication: Effective Business Writing and Speaking, Prentice Hall, 5th Ed., 1999
4. R. Anand, Job Readiness For IT & ITES- A Placement and Career Companion, , McGraw Hill Education.2015
5. Malhotra, A., Campus Placements, McGraw Hill Education.2015