COURSE INFORMATION SHEET

Course code: MA24101
Course title: Mathematics I
Pre-requisite(s): Basic Calculus, Basic Algebra
Co- requisite(s): ---
Credits: L: 3 T: 1 P: 0 C:4
Class schedule per week: 3 Lectures, 1 Tutorial.
Class: BTech.
Semester / Level: I / 1
Branch: All
Name of Teacher:

Course Objectives: This course enables the students to understand:

1.	infinite sequences and series
2.	theory of matrices including elementary transformations, rank and its application in consistency of system of linear equations, eigenvalues, eigenvectors etc.
3.	multivariable functions, partial differentiation, properties and applications of partial derivatives.
4.	integrals of multivariable functions viz. double and triple integrals with their applications
5.	properties like gradient, divergence, curl associated with derivatives of vector point functions and integrals of vector point functions

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

CO1	decide the behaviour of sequences and series using appropriate tests.
CO2	handle problems related to the theory of matrices including elementary transformations, rank and its application in consistency of system of linear equations, eigenvalues, eigenvectors etc.
CO3	get an understanding of partial derivatives and their applications in finding maxima - minima problems
CO4	apply the principles of integrals (multivariable functions viz. double and triple integrals) to solve a variety of practical problems in engineering and sciences
CO5	get an understanding of gradient, divergence, curl associated with derivatives of vector point functions and integrals of vector point functions and demonstrate a depth of understanding in advanced mathematical topics, enhance and develop the ability of using the language of mathematics in engineering

Syllabus

MA24101 **Mathematics – I** **3-1-0-4**

MODULE – I: Sequences and Series

Sequences, Convergence of Sequence. Series, Convergence of Series, Tests for Convergence: Comparison tests, Cauchy's Integral test, Ratio test, Cauchy's root test, Raabe's test, Gauss test, Alternating series, Leibnitz test, Absolute and Conditional Convergence. **[9L]**

MODULE – II: Matrices

Rank of a Matrix, elementary transformations. Vectors, Linear Independence and Dependence of Vectors. Consistency of system of linear equations. Eigenvalues, Eigenvectors, Cayley - Hamilton theorem. **[9 L]**

MODULE – III: Advance Differential Calculus

Function of several variables, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Chain rules, Jacobians and its properties, Taylor series for function of two variables, Maxima – Minima. **[9 L]**

MODULE – IV: Advance Integral Calculus

Double integrals, double integrals in polar coordinates, Change of order of integration, Triple Integrals, cylindrical and spherical coordinate systems, transformation of coordinates, Applications of double and triple integrals in areas and volumes. **[9 L]**

MODULE – V: Vector Calculus

Scalar and vector point functions, gradient, directional derivative, divergence, curl. Line Integral, Work done, Conservative field, Green's theorem in a plane, Surface and volume integrals, Gauss – divergence theorem, Stoke 's theorem. **[9 L]**

Text Books:

1. M. D. Weir, J. Hass and F. R. Giordano: Thomas' Calculus, 11th edition, Pearson Educations, 2008E.
2. H. Anton, I. Brivens and S. Davis, Calculus, 10th Edition, John Wiley and sons, Singapore Pte. Ltd., 2013.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

Reference Books:

1. M. J. Strauss, G. L. Bradley And K. J. Smith, Calculus, 3rd Ed, Dorling.Kindersley (India) Pvt. Ltd. (P Ed), Delhi, 2007.
2. David C. Lay, Linear Algebra and its Applications (3rd Edition), Pearson Ed. Asia, Indian Reprint, 2007.
3. Robert Wrede & Murray R. Spiegel, Advanced Calculus, 3rd Ed., Schaum's outline series, McGraw-Hill Companies, Inc.,2010.
4. D. G. Zill and W.S. Wright, Advanced Engineering Mathematics, Fourth Edition, 2011.

Course Code: CH24101
Course Title: Chemistry
Pre-requisite(s): Intermediate level chemistry
Co- requisite(s):
Credits: 4 L: 3 T: 1 P: 0
Class schedule per week: 04
Class: B. Tech
Semester /Level: I
Branch: Chemistry
Name of Teacher:

Course Objectives

This course enables the students:

A.	To create concept of chemical bonding in coordination chemistry
B.	To understand the basics of stereochemistry, aromaticity and reaction mechanism of organic molecules
C.	To understand the reaction dynamics and to know different types of catalysis
D	To apprehend the basic principles and the application of vibrational, electronic and NMR spectroscopy
E	To develop knowledge on the physical state and electrochemistry of molecules

Course Outcomes

After the completion of this course, students will be:

1.	Able to explain the bonding in a coordination complex
2.	Able to explain the 3D structure, aromaticity and stereochemistry of organic molecules
3.	Able to predict the rate, molecularity and mechanism of a simple as well as catalytic reaction
4	Able to explain the UV-vis, IR and NMR spectra of unknown molecules
5.	Able to interpret the phase diagram of simple one and two component heterogeneous systems in equilibrium and the electrochemical behavior of the molecules

CH24101 **4 (3-1-0)** **CHEMISTRY (Credit: 4)**

Syllabus

Module I: Bonding in Coordination Complex **(8 Lecture)**

Introduction to Chemical Bonding, Werner's Theory, Bonding in coordination complexes, Crystal Field Theory, Octahedral, Tetrahedral and Square planar complexes, CFSE, Jahn Teller theorem, Spectral, electronic and magnetic properties of coordination complexes.

Module II: Organic Structure and Reactivity **(8 Lectures)**

Aromaticity, Geometrical isomerism: *cis–trans,* E/Z, and syn-anti isomerism; Optical isomerism & Chirality; Wedge, Fischer, Newmann and Sawhorse projection formulae and interconversions; D/L, R/S nomenclature system; Conformational studies of n-butane.
Addition, Elimination, Substitution and Rearrangement reaction.

Module III: Kinetics and Catalysis: **(8 Lectures)**

Kinetics of Chain, Parallel/Competing/Side, Consecutive reactions; Fast reactions; Outline of Catalysis, Acid-base catalysis, Enzyme catalysis (Michaelis-Menten equation), Important catalysts in industrial processes: Hydrogenation using Wilkinsons catalyst, Phase transfer catalyst.

Module-IV: Spectroscopic Techniques **(8 Lectures)**

Absorption Spectroscopy, Lambert-Beers law, Principles and applications of UV-Visible spectroscopy, Principles and applications of Vibrational spectroscopy; Introduction of NMR spectroscopy.

Module V: Phase and Chemical equilibrium **(8 Lectures)**

Phase rule: terms involved, Phase diagram of one component (Water) & two component (Pb/Ag) system & their applications; Gibbs Free energy, Van't Hoff equation and Chemical Equilibrium; Nernst Equation, Standard electrode potential, EMF measurement and its application, Batteries and Fuel Cells.

Text books:

1. Huheey, J. E., Inorganic Chemistry: Principles of Structure and Reactivity, 4th edition, Pearson.
2. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Seventh Edition, Pearson
3. Atkins, P. W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.

Reference books:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier (2009).
3. William Kemp, Organic Spectroscopy, 3rd Ed., 2008 Macmillan.

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem	25
Assignment	05
Two Quizzes	20
End Sem Examination Marks	50

Assessment Components	CO1	CO2	CO3	CO4	CO5
Mid Sem	√	√	√		
Assignment	√	√			
Quiz –I	√				
Quiz II				√	
End Sem Examination Marks	√	√	√	√	√

Indirect Assessment –
1. **Student Feedback on Faculty**
2. **Student Feedback on Course Outcome**

Mapping between Objectives and Outcomes

Course Outcome #	Program Outcomes			
	PO1	PO2	PO3	PO4
CO1	M	H	L	L
CO2	H	H	M	L
CO3	H	H	H	M
CO4	H	M	H	L
CO5	H	H	H	M

Mapping Between COs and Course Delivery (CD) methods

CD	Course Delivery methods	Course	Course Delivery

		Outcome	Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, 2, 3, 4	CD1
CD2	Tutorials/Assignments	CO1, 2, 3, 4	CD1,CD2
CD3	Seminars	CO 2, 3	CD3
CD4	Mini projects/Projects	CO3, 4	CD4
CD5	Laboratory experiments/teaching aids	CO 1, 2, 3	CD5
CD6	Self- learning such as use of NPTEL materials and internets	CO1, 2, 3, 4	CD6
CD7	Simulation	CO2, 4	CD7

Lecture wise Lesson planning Details.

Week No.	Lect. No.	Ch. No.	Topics to be covered	Text Book / References	COs mapped	Methodology used
1-3	L1-L8	1	Bonding in Coordination Complex	T1, R1	1	PPT Digi Class/Chock -Board
3-6	L9-L16	2	Organic Structure and Reactivity	T3, R2	1	-do-
6-8	L17-L24	3	Kinetics & Catalysis	T2	2	-do-
9-11	L25-L32	4	Spectroscopic Techniques	T2, R3	3	-do-
11-14	L33-L40	5	Phase and Chemical equilibrium	T3, R2	4	-do-

COURSE INFORMATION SHEET
Basic Electronics

Course code: EC24101
Course title: Basic Electronics
Pre-requisite(s): N/A
Co- requisite(s): N/A
Credits: L: 2 T: 1 P: 0 C:3
Class schedule per week: 03
Class: B. Tech.
Semester / Level: 0I/01
Branch: ALL B.TECH.

Course Objectives

This course enables the students:

1.	To understand PN Junction, diodes and their applications.
2.	To comprehend BJT and the bias configurations.
3.	To understand operating principles of FETs
4.	To understand op amp and its applications.
5.	To apprehend number system, Logic Gates and Boolean algebra.

Course Outcomes

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

CO1	Analyze the characteristics of electronic devices like PN-diode, BJT, JFET and MOSFET
CO2	Classify and analyze the various circuit configurations of BJTs and MOSFETs.
CO3	Analyze the characteristics of operational amplifier
CO4	Design electronic circuits using diodes, transistors, op-amp and logic gates for analog and digital applications.
CO5	Solve day-to-day life problems using electronic circuits

SYLLABUS

MODULE	(NO. OF LECTURE HOURS)
Module – I **Diodes and Applications:** Introduction to semiconductor materials, PN junction diode, barrier potential, depletion layer width, junction capacitance, diode current equation, I-V plot, diode-resistance, temperature dependence, breakdown mechanisms, Zener diode – operation and applications, Diode as a Rectifier: Half Wave and Full Wave Rectifiers with and without C-Filters.	**8**

Module – II **Bipolar Junction Transistors (BJT):** Basic operation of PNP and NPN Transistors, Input and Output Characteristics of CB, CE and CC Configurations. Transistor biasing: operating point, Fixed bias, emitter bias, voltage divider bias, stability factor, small signal analysis (h-parameter model) of CE configuration.	**8**
Module – III **Field Effect Transistors:** JFET: Principle of operation, transfer characteristics, MOSFET: Operation of N-MOS, P-MOS, enhancement and depletion type, transfer characteristics, CS biasing of JFET and MOSFET.	**8**
Module – IV **Operational Amplifiers:** Introduction of Operational Amplifier, Characteristics of Operational Amplifier, Differential Amplifier, CMRR, Slew Rate, input and output offset voltages, Inverting and non-inverting amplifiers, Summing Amplifier, Difference amplifier, Differentiator and Integrator.	**8**
Module – V **Boolean Algebra and Logic Gates:** Boolean Algebra, Boolean operators, Truth table of different digital logic gates (AND, OR, NOT, NAND, NOR, EXOR, EX-NOR), application of diode for design of logic gates, realization of logic gates using universal gates, adder, subtractor.	**8**

Textbooks:

1. Millman J., Halkias C.C. "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw-Hill.
2. Boylstead R.L., Nashelsky L., "Electronic Devices and Circuit Theory", Pearson Education, Inc, 11/e.
3. Mano M.M., Michael D. Ciletti, "Digital Design", Pearson Education, Inc, 5/e, 2011.

Reference books:

1. Millman J., Halkias C.C., Parikh Chetan, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw-Hill, 2/e.
2. Millman J., Halkias C.C., Satyabrata Jit, "Millman's Electronic Devices and Circuits", Tata McGraw-Hill, 3/e.
3. Albert Paul, Malvino, David J. Bates, "Electronic principles", McGraw-Hill, 8/e, 2015.

Gaps in the syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: 3, 11, 12

Topics beyond syllabus/Advanced topics/Design: NA

POs met through Topics beyond syllabus/Advanced topics/Design: 2, 3, 11, 12

Course Outcome (CO) Attainment Assessment Tools and Evaluation Procedure

COURSE INFORMATION SHEET

Course code: **ME24101**
Course title: Basics of Mechanical Engineering
Pre-requisite(s):NIL
Co- requisite(s):NIL
Credits: 3 L: 2, T: 1, P: 0
Class schedule per week: 03
Class: B. Tech
Semester: Second
Branch: All
Name of Teacher:

Course Objectives

This course enables the students:

1.	To introduce system of forces and write equation of equilibrium.
2.	To analyse motion of particle and rigid body subjected to force.
3.	To grasp the importance of internal and external combustion engines.
4.	To apprehend the fundamentals of friction.
5.	To understand the different sources of energy.

Course Outcomes

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

CO1	Explain the basics of Mechanical Engineering.
CO2	Apply various laws of mechanics on static and dynamic elements and bodies.
CO3	Analyse various problems of mechanics related to static and dynamic bodies.
CO4	Evaluate the real life problem related to mechanics and energy for its probable solution.

AKRay
23/7/24

(ME24101) Basics of Mechanical Engineering

Syllabus

Module	Hours
Module 1: System of Forces and Structure Mechanics Addition of Forces, Moment of a Force, Couple, Varignon's theorem, Free Body Diagram, Equilibrium in Two and Three Dimensions, Equivalent Forces and Moment. Types of Plane Trusses, Analysis of Plane Trusses by: Method of Joints and Method of Sections. Hooke's Law of elasticity, Stress and Strain, Relation between elastic constants.	8
Module 2: Kinematics & Kinetics of rigid bodies Types of rigid body motion– translation, rotation about fixed axis, equations defining the rotation of a rigid body about a fixed axis, plane motion, absolute and relative velocity in plane motion, instantaneous center of rotation. Equation of motion and D'Alembert's principle.	8
Module 3: Friction Interfacial Friction (a) Laws of dry friction, static & kinetic co-efficient of friction, Analysis of static, kinetic and rolling friction. (b) Analysis of frictional forces in inclined planes, wedges, screw jacks and belt drives.	8
Module 4: Boilers and Internal Combustion Engine Classification of Boilers, Fire tube and Water Tube boilers. Boiler Mountings and Accessories. Boiler efficiency. Classification of I C Engines. Basic components and terminology of IC engines, working principle of four stroke and two stroke - petrol and diesel engine.	8
Module 5: Non-Conventional Energy Sources Renewable and Non-renewable Energy Resources, Advantages and Disadvantages of Renewable Resources, Renewable Energy Forms and Conversion- Solar Energy, Wind Energy, Hydro Energy.	8

Textbooks

1. Engineering Mechanics, Irving H. Shames, P H I. ltd, 2011.
2. Boiler operator, Wayne Smith, LSA Publishers, 2013.
3. Internal Combustion Engines, M. L. Sharma and R. P. Mathur, Dhanpat Rai Publications, 2014.
4. Fundamentals of Renewable Energy Processes, Aldo Vieira Da Rosa, Elsevier publication, 2012.

Reference Books

1. Engineering Mechanics : statics, James L. Meriam, L. G. Kraige, Wiley, 7th Edition, 2011.
2. Engineering Mechanics, S. Rajasekaran & G. Sankarasubramaniam, Vikash publishing house, 2018.
3. An Introduction to Steam Boilers, David Allan Low, Copper Press Publisher, 2012.
4. Internal Combustion Engines – V Ganesan, McGraw hill, 2017.
5. Non Conventional Energy Resources, B. H. Khan, McGraw Hill Education Publisher, 2017.
6. Principles of Mechanical Engineering, R. P. Sharma & Chilkesh Ranjan, Global Academic Publishers, 2016.

23/7/24

COURSE INFORMATION SHEET

Course code: CE24101
Course title: ENVIRONMENTAL SCIENCE
Pre-requisite(s): NA
Co- requisite(s): NA
Credits: 2 L:2 T:0 P:0
Class schedule per week: 2
Class: B.Tech.
Semester / Level: 1 & 2/ 1
Branch: All
Name of Teacher:

Course Objectives
This course enables the students:

1	To develop basic knowledge of ecological principles and their applications in environment.
2	To identify the structure and composition of the spheres of the earth, the only planet sustaining life.
3	To analyse, how the environment is getting contaminated and probable control mechanisms for them.
4	To generate awareness and become a sensitive citizen towards the changing environment.

Course Outcomes
After the completion of this course, students will be:

1	Able to explain the structure and function of ecosystems and their importance in the holistic environment.
2	Able to identify the sources, causes, impacts and control of air pollution.
3	Able to distinguish the various types of water pollution happening in the environment and understand about their effects and potential control mechanisms.
4	Able to judge the importance of soil, causes of contamination and need of solid waste management.
5	Able to know the impacts of noise pollution and its management

Syllabus

Module 1. Ecosystem and Environment **[6 L]**

Concepts of Ecology and Environmental science, ecosystem: structure, function and services, Biogeochemical cycles, energy and nutrient flow, ecosystem management. Concept of Biodiversity.

Module 2: Air Pollution **[6 L]**

Structure and composition of unpolluted atmosphere, classification of air pollution sources, types of air pollutants, effects of air pollution, monitoring of air pollution, Air pollution control and management.

Module 3: Water Pollution **[6 L]**

Water Resource; Water Pollution: types and Sources of Pollutants; effects of water pollution; Water quality monitoring, Water quality index, water and wastewater treatment: primary, secondary and tertiary.

Module 4: Soil Pollution and Solid Waste Management **[6 L]**

Soil profile, soil properties, soil pollution, Municipal solid waste management. MSW – Functional elements of MSW.

Module 5: Noise Pollution **[6 L]**

Noise pollution: introduction, sources, outdoor and indoor noise propagation, Effects of noise on health, criteria noise standards and limit values, Noise measurement techniques, prevention and control of noise pollution.

Text books:

1. A, K. De. (3rd Ed). 2008. Environmental Chemistry. New Age Publications India Ltd.
2. R. Rajagopalan. 2016. Environmental Studies: From Crisis to Future by, 3rd edition, Oxford University Press.
3. Eugene P. Odum. 1971. Fundamentals of Ecology (3rd ed.) -. WB Sunders Company, Philadelphia.
4. C. N. Sawyer, P. L. McCarty and G. F. Parkin. 2002. Chemistry for Environmental Engineering and Science. John Henry Press.
5. S.C. Santra. 2011. Environmental Science. New Central Book Agency.

Reference books:

1. D.W. Conell. Basic Concepts of Environmental Chemistry, CRC Press.
2. Peavy, H.S, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International
3. G.M. Masters & Wendell Ela. 1991. Introduction to Environmental Engineering and Science, PHI Publishers.

COURSE INFORMATION SHEET

Basic Electronics Lab

Course code: EC24102
Course title: Basic Electronics Lab
Pre-requisite(s): N/A
Co- requisite(s): N/A
Credits: L: 0 T: 0 P: 2 C:1
Class schedule per week: 02
Class: B. Tech.
Semester / Level: I/01
Branch: ALL B.TECH.

Course Objectives

This course enables the students:

1.	To measure magnitude, time-period, frequency, phase of signals using CRO
2.	To know PN junction characteristics and its applications
3.	To understand the working of transistor amplifier
4.	To understand the working of operational amplifier and circuits
5.	To realize logic gates and implement simple Boolean expression

Course Outcomes

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

CO1	Familiarize with electronics components like diode, transistors, ICs
CO2	Make use of measuring instruments and function generators
CO3	Verify characteristics of diodes, transistors and op-amp
CO4	Design electronic circuits using diodes, transistors, op-amp for analog applications
CO5	Design electronic circuits using logic gates for digital applications

List of Experiments

Experiment No.	Name of the Experiments
1.	**MEASURMENTS USING CRO** AIM-1: To understand the Measurement of voltage, time-period and frequency of different signals on CRO. AIM-2: To measure the frequency and phase of two different signals using Lissajous pattern.
2.	**PN JUNCTION CHARACTERISTICS** AIM-1: To determine the forward bias V-I characteristics of PN junction diode and finding its forward cut-in voltage. AIM-2: To determine the reverse bias V-I characteristics of PN junction diode and finding its reverse breakdown voltage.

3.	**ZENER DIODE CHARACTERISTICS** AIM-1: To design a basic voltage regulator circuit using Zener diode. AIM-2: To determine the reverse bias V-I characteristics of Zener diode and finding its reverse breakdown voltage.
4.	**HALF-WAVE RECTIFIER CIRCUIT** To understand the basic operation principle of Half-wave rectifier circuit and measurement of rectification efficiency and ripple factor with and without C-Filter.
5	**FULL-WAVE RECTIFIER CIRCUIT** To understand the basic operation principle of Full-wave rectifier circuit and measurement of rectification efficiency and ripple factor with and without C-Filter.
6	**COMMON EMITTER (CE) TRANSISTOR AMPLIFIER** AIM-1: To understand the basic operation principle of CE transistor amplifier circuit and finding its frequency response. AIM-2: To determine the gain bandwidth product of CE transistor amplifier from its frequency response.
7	**FIELD EFFECT TRANSISTOR CHARACTERISTICS** AIM-1: To determine the output and transfer characteristics of JFET. AIM-2: To measure the voltage gain of JFET.
8	**INVERTING AND NON-INVERTING OPERATIONAL AMPLIFIER (OP-AMP)** AIM-1: To design the inverting operational amplifier using IC741 OP-AMP and find its frequency response. AIM-2: To design the non-inverting operational amplifier using IC741 OP-AMP and find its frequency response.
9	**DIFFERENTIAL AMPLIFIER** AIM-1: To design common mode and differential mode circuit using IC741 OP-AMP AIM-2: To obtain common mode gain and differential mode gain and calculate CMRR.
10	**DIFFERENTIATOR AND INTEGRATOR CIRCUITS USING OP-AMP** AIM-1: To design differentiator circuit using IC741 OP-AMP and observe waveforms. AIM-2: To design integrator circuit using IC741 OP-AMP and observe waveforms.
11.	**REALIZATION OF LOGIC GATES** AIM-1: To understand basic Boolean logic functions (NOT, AND, OR). AIM-2: To realize the basic logic gates (AND, OR, NOT) using NAND Gate (IC-7400).
12.	**IMPLEMENTATION OF BOOLEAN FUNCTION** AIM-1: To understand AND Gate IC (IC 7408) and OR Gate IC (IC 7432) AIM-2: To implement a given Boolean expression using logic gate ICs.

Text Books:

1. Millman J., Halkias C.C., Parikh Chetan, "Integrated Electronics: Analog and Digital Circuits and Systems", Tata McGraw-Hill, 2/e.
2. Mano M.M., "Digital Logic and Computer Design", Pearson Education, Inc, Thirteenth Impression, 2011.
3. Singal T. L., "Analog and Digital Communications", Tata McGraw-Hill, 2/e.
4. Haykin S., Moher M., "Introduction to Analog & Digital Communications", Wiley India Pvt. Ltd., 2/e.

Reference Book:

1. Boylstead R.L., Nashelsky L., "Electronic Devices and Circuit Theory", Pearson Education, Inc, 10/e.

Gaps in the syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: N/A.

Topics beyond syllabus/Advanced topics/Design: N/A

POs met through Topics beyond syllabus/Advanced topics/Design: N

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Progressive Evaluation	**(60)**
Attendance Marks	**12**
Day-to-day performance Marks	**06**
Lab Viva marks	**20**
Lab file Marks	**12**
Lab Quiz-I Marks	**10**
End SEM Evaluation	**(40)**
Lab Quiz-II Marks	**10**
Lab performance Marks	**30**

Course code: CH24102
Course title: Chemistry Lab

Pre-requisite(s): Intermediate level chemistry**Co- requisite(s):**
Credits: 1 L: 0 T: 0 P: 2

Class schedule per week: 02
Class: B. Tech
Semester Level: I

Course Objectives

This course enables the students:

A.	To understand about synthesis of Organic and Inorganic compounds.
B.	To understand the spectroscopic data
C.	To develop concept of potentiometric and pH metric titration of acid and base
D	To understand the rate constant of chemical reaction
E	To develop knowledge of melting point and estimation of Eutectic and transition temperature

Course Outcomes

After the completion of this course, students will be:

1.	Able to perform Synthesis of Organic and Inorganic compounds.
2.	Able to analyze the spectroscopic data
3.	Able to perform potentiometric and pH metric titration of acid and base
4	Able to determine the rate constant of chemical reaction
5.	Measurement of melting point and estimation of Eutectic and transition temperature

Syllabus:

List of Experiments:

1. Gravimetric estimation of Nickel by Dimethylglyoxime.
2. Quantitative estimation of Ca^{2+} and Mg^{2+} ions by complexometric titration using Na_2-EDTA.
3. To verify Bears Law using Fe^{3+} solution by spectrophotometer/colorimeter and to determine

theconcentration of a given unknown Fe^{3+} solution.

4. Preparation of Diazoamino Benzene and report the melting point and yield of product.

5. Draw melting point-mass percent composition diagram for two component mixture and determine theEutectic Temperature.

6. To study the kinetics of acid-catalyzed hydrolysis of ethyl acetate and to evaluate the value of the rateconstant.

7. To determine the strength of the given strong acid by strong base potentiometrically.

8. To determine the transition temperature of the given salt hydrate.

9. Qualitative detection of special elements in organic compounds.

10. To draw the pH-titration curve of strong acid vs strong base.

Reference book:

1. Experimental Physical Chemistry, By B. Viswanathan, P. S. Raghavan, Narosa Publishing House (1997).
2. Vogels Textbook of Practical Organic Chemistry
3. Experiments in General chemistry, C. N. R. Rao and U. C. Agarwal
4. Experimental Organic Chemistry Vol 1 and 2, P R Singh, D S gupta, K S Bajpai, Tata McGraw Hill

Lab Check-In:

General:

- Laboratory apron and experimental notebook is mandatory to work in the laboratory.
- Be sure that all of your glassware, labwares, equipment etc. is present with you to conduct your experiment.
- Once you have checked-in, you will be responsible for missing labware items issued to you. Pay particular attention to the labwares, which is expensive and required for several students for their experiments, treat it with respect.
- It is your responsibility to clean all of the used labwares, glassware etc. and your work place after completion of your experiment before leaving lab.
- Learn the cleaning and drying technique for glassware's. Always use clean and dry glassware's for your experiment.
- Learn Good and Safe Laboratory Practice. Learn the safe handling of labwares, glassware's, chemicals, equipment, etc. Ask you lab instructor/Teacher for any queries.

- You need to maintain your lab record book updated as per instruction and be sure to get verified &signed by your teacher in every lab classes.
- Keep your personal safety googles, lab aprons etc. with you for your next time use.

COURSE INFORMATION SHEET

Course code:	**ME24102**
Course title:	Engineering Graphics
Credits: 2.0	L: 0, T:0 , P:4
Class/ week:	04
Class:	B. Tech
Semester:	Second
Branch:	All
Name of Teacher:	

Course Objectives

This course enables the students:

1.	To understand the basic principles of Engineering Graphics, which include projections of 1D, 2D and 3D objects.
2.	To visualize a solid object (including sectioned) and convert it into drawing.
3.	To visualize different views of any object.
4.	To develop skill to draw objects using AutoCAD software.
5.	To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects.

Course Outcomes

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

CO1	Explain the fundamentals of Engineering Graphics and projection and acquire visualization skills.
CO2	Demonstrate the concept of projections of points and lines for various engineering applications.
CO3	Apply the concept of projections to construct planes and solids, and its orthographic projections which are positioned in various configurations.
CO4	Demonstrate the understanding of AutoCAD software commands to draw projections of points, lines, planes and solids.

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(ME24102) Engineering Graphics Lab

Syllabus

Module	Hours
Module 1: Introduction to Engineering Graphics, dimensioning and projections, orthographic projections, Fundamentals of First and Third Angle projection, Orthographic projections of points.	9
Module 2: Orthographic projections of straight lines: lines parallel to HP and VP, lines inclined to HP and Parallel to VP, line inclined to VP and parallel to HP, line inclined to both reference planes. Orthographic projections of planes/lamina: lamina parallel to both HP and VP, lamina parallel to HP and perpendicular to VP (and vice versa), lamina inclined to HP and perpendicular to VP, lamina inclined to VP and perpendicular to HP, lamina inclined to both reference planes.	9
Module 3: Projections of solids (cube, prism, pyramid, tetrahedron) - axis perpendicular to HP and inclined to VP and inclined to one or both planes. Section of solids: sectional plane perpendicular to one plane and parallel/inclined to another plane.	9
Module 4: Working with AutoCAD Commands, Cartesian Workspace, Basic Drawing & Editing Commands, Drawing: Lines, Rectangles, Circles, Arcs, Polylines, Polygons, Ellipses, Creating Fillets and Chamfers, Creating Arrays of Objects, Working with Annotations, Adding Text to a Drawing, Hatching, Adding Dimensions, Dimensioning Concepts, Adding Linear Dimensions, Adding Radial & Angular Dimensions, Editing the Dimensions.	9
Module 5: Create views of points, lines, planes, and various types of solids (cube, prism, pyramid, tetrahedron, etc.) using AutoCAD software.	9

Text Books

1. Engineering Drawing by N. D. Bhatt, Charotar Publishing House Pvt.Ltd., 53rd Edition, 2014.

2. Engineering Drawing and Graphics + AutoCAD by K. Venugopal, New Age International (P) Limited, 4th Reprint: June, 2017.

Reference Books

1. Engineering Graphics with Autocad by J. D. Bethune, Prentice Hall, 2007.

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COURSE INFORMATION SHEET

Course code: PE24102
Course title: WORKSHOP PRACTICE
Pre-requisite(s): None
Co-requisite(s): None
Credits: 1 L:0 T:0 P: 2
Class schedule per week: 2
Class: B.Tech.
Semester / Level: I or II / First
Branch: All
Name of Teacher:

Course Objectives:
This course enables the students to:

1	Familiarize with the basics of manufacturing processes.
2	Impart knowledge and skill to use tools, machines, equipment, and measuring instruments.
3	Practice on manufacturing of components using workshop trades.
4	Educate students on the safe handling of machines and tools.
5	Exercise individual as well as group activity with hands-on training in different workshop trades.

Course Outcomes:
At the end of the course, a student should be able to:

CO 1	Be conversant with the basic manufacturing processes.
CO 2	Identify and apply suitable tools and instruments for carpentry, foundry, welding, fitting, and conventional and modern machining.
CO 3	Manufacture different components using various workshop trades.
CO 4	Take safety and precautionary measures for self and machines during operations.
CO 5	Develop skills to work as an individual or in a team during trade practices.

SYLLABUS

LIST OF EXPERIMENT:

1. **CARPENTRY SHOP**
   EXPERIMENT-I: Carpentry Tools and Instruments
   Objective: To study the various tools, instruments and equipment used in carpentry practice.

2. **CARPENTRY SHOP**
   EXPERIMENT-II: Carpentry Practice
   Objective: To perform the carpentry work by making a wooden job using different tools.

3. **FOUNDRY SHOP**
   EXPERIMENT-I: Green Sand Moulding
   Objective: To get acquainted with various tools and equipment used in making green sand mould (to practice green sand mould making with single-piece patterns).

4. **FOUNDRY SHOP**
   EXPERIMENT-II: Aluminium Casting
   Objective: To get acquainted with melting and pouring metal in a mould (given two-piece patterns of handle) and to make aluminium casting.

5. **WELDING SHOP**
   EXPERIMENT-I: Manual Metal Arc Welding
   Objective: To study arc welding processes including arc welding machines (AC & DC), electrodes and equipment. To join two pieces of given metal by the arc welding process.

6. **WELDING SHOP**
   EXPERIMENT-II: Gas Welding
   Objective: To study gas welding processes, including types of flames produced, filler metals and fluxes, etc. To join two pieces of given metal by the gas welding process.

7. **FITTING SHOP**
   EXPERIMENT-I: Fitting Tools and Measuring Instruments
   Objective: To study the various tools used in the fitting shop and perform fitting operations (like marking, chipping, hack-sawing, filing, drilling, etc.)

8. **FITTING SHOP**
   EXPERIMENT-II: Fitting Assembly Practice
   Objective: To make a job clamping plate as per the given drawing by fitting operations and to check for its assembly with a given component.

9. **MACHINE SHOP**
   EXPERIMENT – I: Centre Lathe Machine
   Objective: To study lathe machine and to machine a given job on the centre lathe as per drawing.

10. **MACHINE SHOP**
    EXPERIMENT-II: Shaper Machine

Objective: To study the Shaper machine and to machine a given job on the shaper as per drawing.

11. MODERN MACHINE SHOP

EXPERIMENT – I: CNC Lathe Machine

Objective: To provide an introduction to the functionality and operation of the CNC Lathe Machine through practical demonstration.

12. MODERN MACHINE SHOP

EXPERIMENT-II: CNC Surface Grinding Machine

Objective: To provide an introduction to the functionality and operation of the CNC Surface Grinding Machine through practical demonstration.

Books recommended:

TEXT BOOK

1. S K Hajra Choudhury, A K. Hajra, "Elements of Workshop Technology: Vol- I and Vol -II", Media Promotors Pvt Ltd. **(T1)**
2. B S Raghuwanshi, "A course in Workshop Technology", Dhanpat Rai Publications. **(T2)**

REFERENCE BOOK

1. P.N. Rao, "Manufacturing Technology Vol-1and Vol-II", Tata McGraw Hill. **(R1)**
2. Kalpakjian, "Manufacturing Engineering and Technology", Pearson. **(R2)**

Gaps in the syllabus (to meet Industry/Profession requirements):

POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:

POs met through Topics beyond syllabus/Advanced topics/Design:

Course Delivery Methods:

CD1	Lecture by use of boards/LCD projectors/OHP projectors	√
CD2	Assignments/Seminars	
CD3	Laboratory experiments/teaching aids	√
CD4	Industrial/guest lectures	
CD5	Industrial visits/in-plant training	
CD6	Self- learning such as use of NPTEL materials and internets	
CD7	Simulation	√

Course Evaluation:

Direct Assessment-

COURSE INFORMATION SHEET

Course code: PH24101
Course title: PHYSICS
Pre-requisite(s): Intermediate Physics and Intermediate Mathematics
Co- requisite(s): Mathematics I
Credits: 4
Class schedule per week: 4 L:3 T:1 P:0
Class: B. Tech
Semester / Level: I
Branch: ALL
Name of Teacher:

Course Objectives

This course enables the students:

A.	To explain principles of physical optics and to have basic idea of fiber optics.
B.	To construct Maxwell's equations from basic principles and use it to solve electromagnetic plane wave equations.
C.	To distinguish between Newtonian Mechanics and special theory of relativity and develop the relationship of length contraction, time dilation and Einstein energy mass relation and to apply the concepts of special theory of relativity in various field of physics and engineering.
D.	To illustrate the phenomena of old quantum theory and derive Heisenberg uncertainty principle and Schrodingers equations
E.	To interpret basic lasing action, study various types of lasers, and to have basic idea of nuclear physics and plasma physics

Course Outcomes

After completion of course, students will be

1.	Able to analyse the intensity variation of light due to Polarization, interference and diffraction.
2.	Able to formulate and solve the engineering problems on electromagnetism
3.	Able to explain special theory of relativity and apply its concepts in various fields of physics and engineering.
4.	Able to explain fundamentals of quantum mechanics and apply it to problems on bound states
5.	Able to explain working principle of lasers and to summarize its applications, understand basic idea of nuclear and plasma physics

Physics for semester – I (B.Tech. program)
Course Code: PH24101
Title: PHYSICS

Module-1: Physical Optics: Polarization, Malus' Law, Brewster's Law, Double Refraction, Interference in thin films (Parallel films), Interference in wedge-shaped layers, Newton's rings, Fraunhofer diffraction by single slit, Double slit. Elementary ideas of fibre optics and application of fibre optic cables. **[8 hrs]**

Module-2: Electromagnetic Theory: Gradient, Divergence and Curl, Statement of Gauss theorem & Stokes theorem, Gauss's law, Applications, Concept of electric potential, Relationship between E and V, Polarization of dielectrics, dielectric constant, Boundary conditions for E & D, Gauss's law in magnetostatics, Ampere's circuital law, Boundary conditions for B & H, Equation of continuity, Displacement current, Maxwell's equations. **[8 hrs]**

Module-3: Special Theory of Relativity: Introduction, Inertial frame of reference, Galilean transformations, Postulates, Lorentz transformations and its conclusions, Length contraction, time dilation, velocity addition, Mass change, Einstein's mass energy relation. **[6 hrs]**

Module-4: Quantum Mechanics: Planck's theory of black-body radiation, Compton effect, Wave particle duality, De Broglie waves, Davisson and Germer's experiment, Uncertainty principle, Brief idea of Wave Packet, Wave Function and its physical interpretation, Schrodinger equation in one-dimension, free particle, particle in an infinite square well. **[9 hrs]**

Module-5: Modern Physics: Laser-Spontaneous and stimulated emission, Einstein's A and B coefficients, Population inversion, Light amplification, Basic laser action, Ruby and He-Ne lasers, Properties and applications of laser radiation, Nuclear Physics- Binding Energy Curve, Nuclear Force, Liquid drop model, Introduction to Shell model, Applications of Nuclear Physics, Concept of Plasma Physics, and its applications. **[9 hrs]**

Textbooks:

1. A. Ghatak, Optics, 4th Edition, Tata Mcgraw Hill, 2009
2. Mathew N.O. Sadiku, Elements of Electromagnetics, Oxford University Press (2001)
3. Arthur Beiser, Concept of Modern Physics, 6th edition 2009, Tata McGraw- Hill
4. F. F. Chen, Introduction to Plasma Physics and controlled Fusion, Springer, Edition 2016.

Reference books:

1. Fundamentals of Physics, Halliday, Walker and Resnick

COURSE INFORMATION SHEET

Course code: **BE24101**
Course title: **Biological Science for Engineers**
Pre-requisite(s): NIL
Co- requisite(s): NIL
Credits: 2 L: 2, T: 0, P: 0
Class schedule per week: 02
Class: B. Tech
Semester: First/Second
Branch: All
Name of Teacher:

Course Objectives

This course enables the students:

1.	To understand fundamental concepts of biology relevant to engineering.
2.	To explore the structure and function of biological molecules and cells.
3.	To learn about genetic principles and molecular biology techniques.
4.	To understand the applications of biological science in various engineering fields considering global challenges and ethical considerations.

Course Outcomes

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

CO1	Comprehend and apply the fundamental concepts of biological sciences in the context of engineering.
CO2	Analyze the structure and function of biological molecules and cells and their relevance to engineering solutions.
CO3	Demonstrate understanding of genetic principles and molecular biology techniques and their applications in engineering.
CO4	Apply knowledge of biological sciences to innovate and develop solutions in various engineering domains and critically evaluate the role of biological sciences in addressing global challenges, including ethical and safety considerations.

(BE24101) Biological Science for Engineers

Syllabus

Module	Hours
Module I: Introduction to Biological Sciences Overview and importance of biology in engineering, Origin of Life, Cell Theory and Structure	6
Module II: Molecular Biology and Genetics Central Dogma of Molecular Biology, DNA, RNA and Protein structure and function, Mendelian Genetics, rDNA Technology and Genome Editing	6
Module III: Biochemistry Cell Metabolism, Enzymes and Catalysis, Cell Communication and Signalling	6
Module IV: Applications of Biological Sciences in Engineering Biomaterials, Bioinformatics, Biosensors and Bioelectronics (Biological Sensors- Ear & Eye), Synthetic Biology, Nanobiotechnology	6
Module V: Global Challenges and Ethical Considerations	6

Textbooks

Books Recommended

- **Lehninger A, Principals of Biochemistry**
- **Stryer L, Biochemistry**
- **K. Wilson & K.H. Goulding, A biologist's guide to Principles and Techniques of Practical Biochemistry.**
- **Biology for Engineers" by Arthur T. Johnson**

Reference Books

1. **Purves et al, Life: The Science of Biology**
2. **R. Dulbecco, The Design of Life.**
3. **Biological Science Edited by Soper, Cambridge low price edition.**
4. **Synthetic Biology: A Primer" by Paul S. Freemont and Richard I. Kitney**
5. **"Introduction to Bioinformatics" by Arthur Lesk**
6. **Genomes" by T.A. Brown**

COURSE INFORMATION SHEET

Course code: EE24101
Course Title: Basics of Electrical Engineering
Pre-requisite(s): Basic Sciences
Co-requisite(s):
Credits: L: 2 T: 1 P: 0 C:3
Class schedule per week: 03
Class: B. Tech.
Semester / Level: I/ 01
Branch: All
Name of Teacher:

Course Objectives

This course enables the students:

A. To realise the electrical signals, elements, and their properties.
B. To understand the mathematical representation of AC, DC signals and theorems/laws for solving electrical circuits with variations of voltage and frequency.
C. To perceive the 3-phase AC signal representation and 3-phase circuit analysis for balanced and unbalanced condition.
D. To understand the characteristics of magnetic material and analysis of magnetic circuits.

Course Outcomes

After the completion of this course, students will be:

1. to explain the voltage, current signals and their behaviour in resistance, inductor and capacitor.
2. to apply the theorems/laws for electrical circuit analysis.
3. to solve the electrical circuits for variable voltage, frequency, and power to observe the resonance and power factor in the electric circuit.
4. to evaluate the 1-phase and 3-phase AC balanced and unbalanced circuits
5. to apply the concept of magnetic circuits for magnetic circuit analysis.

EE24101 Basics of Electrical Engineering

SYLLABUS

MODULE – I

Introduction: Importance of Electrical Engineering in day-to-day life, Electrical elements, properties (linear, non-linear, unilateral, bilateral, lumped and distributed, etc.) and their classification, Ideal and Real Sources, Source Conversion, Star-Delta conversion, KCL and KVL, Mesh current and Nodal voltage method. (8)

MODULE – II

D.C. Circuits: Steady state analysis with independent and dependent sources; Series and Parallel circuits.

Circuit Theorems: Superposition, Thevenin's, Norton's, and Maximum Power Transfer theorems for Independent and Dependent Sources applied to DC circuits. (8)

MODULE – III

Single-phase AC Circuits: Common signals and their waveforms, RMS and Average value. Form factor & Peak factor of a sinusoidal waveform. **Series Circuits:** Impedance of Series circuits. Phasor diagram. Active Power. Power factor. Power triangle. **Parallel Circuits:** Admittance method, Phasor diagram, Power and Power factor Power triangle, Series-parallel Circuit, Power factor improvement, Circuit Theorems applied to AC circuits.

Series and Parallel Resonance: Resonance curve, Q–factor, Dynamic Impedance, and Bandwidth. (12)

MODULE – IV

Three-Phase AC Circuits: Importance and use of a 3-phase network, types of 3-phase connections- Star and Delta, Line and Phase relations for Star and Delta connection, Phasor diagrams, Power relations, analysis of balanced and unbalanced 3-phase circuits, Measurement of Power in 3-phase star and delta network.

(6)

MODULE – V

Magnetic Circuits: Introduction, Series-parallel magnetic circuits, Analysis of Linear and Non-linear magnetic circuits, Energy storage, A.C. excitation, Eddy currents and Hysteresis losses.

Coupled Circuits: Dot rule, Self and mutual inductances, Coefficient of coupling, working of transformer. (6)

Textbooks:

1. W. H. Hayt, Jr J. E. Kemmerly and S. M. Durbin, Engineering Circuit Analysis, 7th Edition TMH, 2010.
2. Hughes, Electrical Technology, Revised by McKenzie Smith, Pearson.
3. Fitzgerald and Higginbotham, Basic Electrical Engineering, McGraw Hill Inc, 1981.

Reference books:

1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, 3rd Edition, TMH, New Delhi, 2009.
2. Electrical Engineering Fundamental, Vincent Del Toro, Prentice Hall, New Delhi.
3. Rajendra Prasad, Fundamentals of Electrical Engineering, 2nd Edition, PHI, New Delhi, 2011.
4. Raymond A. DeCarlo, Prn-Min Lin, Linear Circuit Analysis Time Domain, Phasor and Laplace Transform Approaches, 2nd Edition, Oxford University, 2001

Department of Physics, BIT Mesra

Course code: PH24102 (Physics Lab)

List of Physics Lab Experiments for B.Tech. students

1. Error analysis in Physics Laboratory
2. To determine the frequency of AC mains with the help of sonometer
3. To determine the resistance per unit length of a Carey Foster's bridge wire and resistivity of unknown wire.
4. Measurement of electrical equivalent of heat
5. To determine the wavelength of sodium lines by Newton's rings method
6. To determine the frequency of tuning fork using Melde's Experiment
7. Measurement of voltage and frequency of a given signal using CRO
8. To determine the emf of a cell using stretched wire potentiometer
9. Determination of refractive index of the material of a prism using spectrometer and sodium light
10. To study the frequency response of a series LCR circuit
11. To study Lorentz force using Current balance
12. Study of electromagnetic induction and verification of Faraday's laws.
13. To determine wavelength of prominent spectral lines of mercury light by a plane transmission grating.

COURSE INFORMATION SHEET

Course code: EE24102

Course title: Electrical Engineering Laboratory

Pre-requisite(s): Physics, Fundamentals of Mathematics and Electrical Engineering.

Credits: L:0 T:0 P:2 C:1

Class schedule per week: 2

Course Overview: Concepts of measuring instruments, AC RLC series parallel circuit operation, resonance, KVL and KCL, circuit theorems, 3-phase star and delta connections, measurement of low and high resistance of D.C. machine, measurement of power by three voltmeter, three-ammeter methods, measurement of power of 3-phase by two-wattmeter method.

Course Objectives

This course enables the students:

1.	To describe students' practical knowledge of active and passive elements and operation of measuring instruments
2.	To demonstrate electrical circuit fundamentals and their equivalent circuit models for both 1-φ and 3- φ circuits and use circuit theorems
3.	To establish voltage & current relationships with the help of phasors and correlate them to experimental results
4.	1. To conclude performance of 1 – Φ AC series circuits by resonance phenomena 2. To evaluate different power measurement for both 1-φ and 3- φ circuits

Course Outcomes

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

CO 1	classify active and passive elements, explain working and use of electrical components, different types of measuring instruments;
CO 2	illustrate fundamentals of operation of DC circuits, 1-φ and 3- φ circuits and also correlate the principles of DC, AC 1-φ and 3- φ circuits to rotating machines like Induction motor and D.C machine
CO 3	measure voltage, current, power, for DC and AC circuits and also represent them in phasor notations;
CO 4	analyze response of a circuit and calculate unknown circuit parameters;
CO 5	recommend and justify power factor improvement method in order to save electrical

LIST OF EXPERIMENTS ***(The experiment list may vary to accommodate recent development in the field)***

1. **Name:** Measurement of low & high resistance of DC shunt motor

   Aim:

   (i) To measure low resistance of armature winding of DC shunt motor

   (ii) To measure high resistance of shunt field winding of DC shunt motor

2. **Name:** AC series circuit

   Aim:

   (i) To obtain current & voltage distribution in AC RLC series circuit and to draw the phasor diagram

   (ii) To obtain power & power factor of single-phase load using 3- Voltmeter method and to draw phasor diagram.

3. **Name:** AC parallel circuit

   Aim:

   (i) To obtain current & voltage distribution in AC RLC parallel circuit and to draw the phasor diagram

   (ii) To obtain power & power factor of single-phase load using 3- Ammeter method and to draw the phasor diagram

4. **Name:** Resonance in AC RLC series circuit

   Aim:

   (i) To obtain the condition of resonance in AC RLC series circuit

   (ii) To draw phasor diagram

5. **Name:** 3-phase Star connection

   Aim:

   (i) To establish the relation between line & phase quantity in 3 phase star connection

   (ii) To draw the phasor diagram

6. **Name:** 3-phase Delta connection

   Aim:

   (i) To establish the relation between line & phase quantity in 3 phase delta connection

   (ii) To draw phasor diagram

7. **Name:** 3-phase power measurement

   Aim:

   (i) To measure the power input to a 3-phase induction motor using 2 wattmeter method

   (ii) To draw the phasor diagram

8. **Name:** Self & mutual inductance

   Aim: To determine self & mutual inductance of coils

9. **Name:** Verification of Superposition, Thevenin's and the Reciprocity theorem

Aim:

(i) To verify the Superposition theorem for a given circuit

(ii) To verify Thevenin's theorem for a given circuit

10. **Name:** Verification of Norton's, Tellegen's and Maximum Power transfer theorem

Aim:

(i) To verify Norton's theorem for a given circuit

(ii) To verify the Maximum Power transfer theorem for a given circuit

Gaps in the syllabus (to meet Industry/Profession requirements)

1. Application of principles of magnetic circuits to electrical machines like transformers, generators and motors
2. Visualize Phase sequence

POs met through Gaps in the Syllabus: 1, 2, 3, 7.

Topics beyond syllabus/Advanced topics/Design

1. Assignment: Simulation of electrical circuits with dependent/independent sources by various techniques (Mesh current/Node Voltage/Thevenin's theorem/Norton's theorem/Maximum power transfer theorem etc.) using MATLAB/PSIM/C++ softwares.
2. Active/reactive power calculation for 3 – Φ circuits

POs met through Topics beyond syllabus/Advanced topics/Design: 5, 6, 7, 8, 9.

Mapping of lab experiment with Course Outcomes

Experiment	Course Outcomes				
	CO1	CO2	CO3	CO4	CO5
1	3	3	3	2	
2	3	3	3	3	2
3	3	3	3	3	2
4	3	3	3	3	2
5	3	3	3	1	
6	3	3	3	1	
7	3	3	3	2	2
8	3	3	3	3	
9	3	3	3	2	
10	3	3	3	2	

CO mapping with PO

Course Outcome	Program Outcomes	Program Specific Outcome

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	1	3	1	1	1				2	3	3	1
CO2	3	3	3	1	3	1	1	1				2	3	2	2
CO3	3	3	3	3	3	1	2	2		1	1	2	3	3	2
CO4	3	3	3	1	3	1	1	1		1	1	2	3	2	2
CO5	3	3	3	3	3	1	1	1	1	1	1	2	3	3	1

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors
CD2	Tutorials/Assignments
CD3	Mini projects/Projects
CD4	Laboratory experiments/teaching aids
CD5	Self- learning, such as the use of NPTEL materials and the internet
CD6	Simulation

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI, JHARKAHND

COURSE INFORMATION SHEET

Course code: HU24131
Course title: Communication Skills I (Offered by Cambridge Assessment English)
Pre-requisite(s): Nil
Co- requisite(s): Nil
Credits: L: 0 T:0 P: 3
Contact Hours: 35-40
Class schedule per week: 1
Class: UG/PG
Semester: I (PG) I, II (UG)
Branch: UG/PG

Course Objective

Objective-1	To demonstrate the ability to listen to and comprehend complex speech in English, listen to explanations, descriptions, messages, news stories, opinions, solutions, etc.
Objective-2	To demonstrate the ability to speak effectively in English with peers, teachers and others, handle the various speaking situations in their academic and social sphere with confidence.
Objective-3	To demonstrate the ability to read and analyse functional texts confidently; apply critical thinking, analysis and problem-solving skills to the reading material.
Objective-4	To demonstrate the ability to write messages, personal accounts, critical reviews, short biographies, describe processes, write persuasive essays, etc.
Objective-5	To demonstrate a strong hold on functional grammar which helps them avoid common communication errors.

Course Outcomes

	Modules
CO-1	Communicate confidently in English with their peers and teachers in the immediate environment and with colleagues, clients, etc., in their future workplaces.
CO-2	Apply their learning of English to domain subjects and make presentations, posters, write research papers, lab reports, etc, with confidence.
CO-3	Handle communicative situations confidently in their academic life, such as conversations, discussions, interviews, presentations, seminars, webinars, etc.
CO-4	Prepare for their future workplaces and their requirements, such as handling team huddles, meetings, phone calls, client visits, field visits, inspections, etc.
CO-5	Apply critical thinking abilities to analyse problems, brainstorm solutions, handle situations that require persuasive skills, etc.

SYLLABUS

Module	**Contents**	**BL**
1	**Effective Listening:** The importance of listening: Listening for descriptions of people; listening for opinions; listening for complaints; Listening to people making, accepting, and declining requests; Listening to news stories; listening to messages and a podcast; Process of Listening, Types of Listening, Barriers to Effective Listening, Listening at different managerial levels. Listening for information about living abroad; listening to opinions; Listening to complaints; Listening to environmental problems; listening for solutions; Listening to descriptions of important events; listening to regrets and explanations; Listening to explanations; listening for the best solution; Listening to past obstacles and how they were overcome; listening for people's goals for the future.	1,2
2	**Speaking with Confidence:** Describing personalities; expressing likes and dislikes; agreeing and disagreeing; complaining; Talking about possible careers; describing jobs; deciding between two jobs; Making direct and indirect	2,3

	requests; accepting and declining requests; Narrating a story; describing events and experiences in the past; Talking about travelling abroad; expressing emotions; describing cultural expectations; giving advice; Describing problems; making complaints; explaining something that needs to be done. Identifying and describing problems; coming up with solutions; Asking about preferences; discussing different skills to be learned; talking about learning methods; talking about life skills; asking for and giving advice or suggestions; talking about things to be accomplished in the future; Describing milestones; describing turning points; describing regrets and hypothetical situations; Describing qualities for success; giving reasons for success; interviewing for a job; talking about ads and slogans; Drawing conclusions; offering explanations; Giving opinions for and against controversial topics; offering a different opinion; agreeing and disagreeing.	
3	**Art of Reading:** Reading about unusual social networking sites; Reading about different types of workplaces; Reading about talking to friends about difficult topics; Types of Reading, Methods of Reading, Reading Comprehension. Reading about the reliability of online content; Reading about a problem with a ride-sharing service; Reading about a creative solution to a problem; Reading about different studying styles; Reading about young scientist; Reading about futurists and their predictions for the year 2050; Reading about a conflict and advice on how to fix it; Reading about advertisements; Reading about unexplained events; Reading about a job role; Reading about plagiarism in the digital age.	4
4	**Writing Skills:** Writing a description of a good friend; Writing about two career choices; Writing a message with requests; Writing a personal account; Writing a pamphlet for tourists; Writing a critical online review; Writing a post on a community website; Writing about a skill; Writing a message of advice; Writing a biography; Writing a message of apology; Writing a TV or web commercial; Writing about a process; Writing a persuasive essay; Writing a personal statement for an application.	4,5
5	**Advanced Writing Skills:** Art of condensation: Précis writing, Summary Abstract, Synopsis, Paraphrasing; Paragraph writing; Essay writing: Writing a persuasive essay; Writing a biography; Writing about a process; Writing a personal statement for an application; Writing a critical online review; Writing about a complicated situation; Report writing; Writing technical proposals.	4,5

Textbooks

1	*Interchange 5 edition Level 3,* Jack C. Richards, Jonathan Hull, Susan Proctor, Cambridge University Press. Components: Student's Book with online self-study (print/online bundle) CEFR level: B1

Reference Books

1	Communication Skills (2015) IInd edition, Sanjay Kumar & Pushp Lata, Oxford University Press
2	Business Correspondence and Report Writing, (2020)VIth edition, R.C. Sharma, Krishna Mohan, Virendra Singh Nirban, McGraw Hill
3	Communication for Business, (2010) IVth edition, Shirley Taylor, V. Chandra, Pearson
4	Basic Business Communication-(2004). Lesikar I Flatley, McGraw Hill
5	Business Communication Today, (2017), Bovee, Thill and Chatterjee, Pearson

Direct Assessment

Tools	% Contribution of Assessment
End Semester Evaluation	**100**

बिरला प्रौद्योगिकी संस्थान
BIRLA INSTITUTE OF TECHNOLOGY
(वि॰ अनु॰ आ॰ अधिनियम १९५ की धारा ३ के तहत मानित विश्वविद्यालय | A Deemed to be University u/s 3 of UGC Act, 1956)
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Ref. : CSE/HoD/BoS (Minutes)/2024-25/ 170 Date: 24th July, 2024

MINUTES OF DEPARTMENTAL BOARD OF STUDIES (BOS) MEETING ON 24.07.2024 AT 11:30 A.M

The Departmental BoS meeting was held on **24.07.2024** (Wednesday) to approve the **NEP Course Structure** for **B.Tech. (CSE)** and **B.Tech. (AIML).**

The departmental members of the BoS committee discussed and approved the proposed **NEP Course Structure** for **B.Tech. (CSE)** and **B.Tech. (AIML).**

The meeting ended with a vote of thanks to all present by the HoD, Department of Computer Science & Engineering.

(Dr. Sandip Dutta)
Professor, CSE
Member (BoS)

(Dr. V. Bhattacharya)
Professor, CSE
Member (BoS)

(Dr. V. K. Jha)
Asso. Professor, CSE
Member (BoS)

(Dr. Kumar Rajnish)
Asso. Professor, CSE
Member (BoS)

(Dr. Itu Snigdh)
Asst. Professor, CSE
Member (BoS)

(Dr. Akriti Nigam)
Asst. Professor, CSE
Member (BoS)

C.S.E. Department
Ref. No. 170
Date of Issue 24/07/24

(Dr. S. Biswas)
Professor & Head CSE,
Chairman (BoS)

RECEIVED
No. 43
Date 24/7/24
शैक्षणिक कार्यक्रम कार्यालय/Academic Programme Office
मेसरा, राँची, झारखण्ड-835215 (भारत)
Mesra, Ranchi, Jharkhand-835215 (India)

Course code: CS24101

Course Title: Programming for Problem Solving

Pre-requisite(s): Mathematics-I

Co-requisite(s): Programming for Problem Solving Lab

Credits: L: 3 T: 1 P: 0

Class schedule per week: 4

Class: B. Tech

Semester / Level: II

Branch: All

Course Outcomes

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

1	To formulate simple algorithms for arithmetic and logical problems.
2	To translate the algorithms to programs.
3	To test and execute the programs and correct syntax and logical errors.
4	To apply programmatic skills for solving scientific problems.
5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

Syllabus

Module I **[6 L]**

Representation of an Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs: source code, variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Module II **[8 L]**Structure of a C program, variables and data types, Operators – precedence and associativity, Evaluating expressions, Basic I/O – use of printf, scanf, getchar etc. and format specifiers, Conditional Branching statements – If, If - else, If-else- if, switch case, Writing nested conditional statements.

Module III **[8 L]**

Iterative programming structures – for loops, while loops, do while loops. Understanding break and continue and their usage. Writing Nested loops, Arrays – creation and usage, Strings and string handling.

Module IV **[8 L]**

Functions (including using built in libraries), Parameter passing in functions, call by value,

Recursion, as a different way of solving problems, Nested function calls. Understanding scope and lifetime of a variable.

Module V **[10 L]**

Structures - Defining structures, Accessing structures elements, Creating an array of Structures, Nested structures. Some advanced concepts – typedef, enum, macros. An introduction to pointers – understanding, creating pointers and accessing variables using pointers.Passing arrays to functions: idea of call by reference, passing parameters to main.

Text Books:

- Let us C, Yashwant Kanetkar, 18th Edition, BPB Publications
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- R.G.Dromey, How to Solve it by Computer, Pearson Education

Reference Books

• Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice.

CD#	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars/ Quiz (s)
CD4	Mini projects/Projects
CD5	Laboratory experiments/teaching aids
CD6	Industrial/guest lectures
CD7	Industrial visits/in-plant training
CD8	Self- learning such as use of NPTEL materials and internets
CD9	Simulation

Gaps in the syllabus (to meet Industry/Profession requirements):N/A

POs met through Gaps in the Syllabus:N/A

Topics beyond syllabus/Advanced topics/Design:N/A

POs met through Topics beyond syllabus/Advanced topics/Design:N/A

Course Outcome (CO) Attainment Assessment Tools and Evaluation Procedure Direct Assessment

Assessment Tools	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
Mid semester examination	25
Two quizzes	20(2X10)
Teacher's Assessment	5

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	√	√	√	√	√
Semester End Examination	√	√	√	√	√

Indirect Assessment

1. Student Feedback on Faculty
2. Student Feedback on Course

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments
CD3	Laboratory experiments/Teaching aids/Seminars
CD4	Mini projects
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	3	3	2	1	3	1	2	1	2	3	1	1
CO2	3	3	3	3	3	1	1	2	1	2	1	2	2	3	2
CO3	3	3	2	3	3	1	1	1	1	2	1	3	2	3	2
CO4	3	3	3	3	2	1	1	2	1	2	1	3	3	2	3
CO5	3	3	2	2	3	1	1	2	1	2	1	2	2	2	1

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

Lab

Course code: CS24102

Course Title: Programming for Problem Solving Lab

Pre-requisite(s): Mathematics-I

Co-requisite(s): Programming for Problem Solving

Credits: L: 0 T: 0 P: 2

Class schedule per week: 1

Class: B. Tech

Semester / Level: II

Branch: All

Course Outcomes

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

1	To formulate simple algorithms for arithmetic and logical problems.
2	To translate the algorithms to programs.
3	To test and execute the programs and correct syntax and logical errors.
4	To apply programmatic skills for solving scientific problems.
5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

Syllabus

Module I **[6 L]**

1. Learn how to compile and debug C programs. (preference should be given to XNIX environments.)
2. Write simple programs using sequential logic requiring the declaration of variables for data types.
3. Write programs that produce formatted output.
4. Write programs to acquire data from users and use them in their programs.

Module II **[8 L]**

1. Write simple programs to understand the workings of selection structures.
2. Write programs using concepts of nested selection structures.
3. Learn how to program the switch case structure.

Module III **[8 L]**

1. Write programs using different iterative structures.
2. Write programs using nested iterative structures.

3. Write programs that embed selection structures in loops and vice versa.
4. Writing programs to create and use arrays.
5. Write programs to manipulate strings

Module IV **[8 L]**

1. Write simple functions demonstrating the concepts of parameter passing and return values.
2. Write programs to access global/extern variables from functions.
3. Write programs to demonstrate calling functions from functions.

Module V **[10 L]**

1. Write programs to create and use structures.
2. Write programs to demonstrate the concept of array of structures and passing structure variables to functions.
3. Writing programs to create pointers and understanding their basic properties.
4. Performing call by reference function calls.

Text Books:

- Let us C, Yashwant Kanetkar, 18th Edition, BPB Publications
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- R.G.Dromey, How to Solve it by Computer, Pearson Education

Reference Books

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CD2	Tutorials/Assignments
CD3	Seminars/ Quiz (s)
CD4	Mini projects/Projects
CD5	Laboratory experiments/teaching aids
CD6	Industrial/guest lectures
CD7	Industrial visits/in-plant training
CD8	Self- learning such as use of NPTEL materials and internets
CD9	Simulation

Gaps in the syllabus (to meet Industry/Profession requirements):N/A

POs met through Gaps in the Syllabus:N/A

Topics beyond syllabus/Advanced topics/Design:N/A

POs met through Topics beyond syllabus/Advanced topics/Design:N/A

Course Outcome (CO) Attainment Assessment Tools and Evaluation Procedure Direct Assessment

Assessment Tools	**% Contribution during CO Assessment**
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	**% Distribution**
Mid semester examination	25
Two quizzes	20(2X10)
Teacher's Assessment	5

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Continuous Internal Assessment	√	√	√	√	√
Semester End Examination	√	√	√	√	√

Indirect Assessment

1. Student Feedback on Faculty
2. Student Feedback on Course

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments
CD3	Laboratory experiments/Teaching aids/Seminars
CD4	Mini projects
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO1	3	3	3	3	3	2	1	3	1	2	1	2	3	1	1
CO2	3	3	3	3	3	1	1	2	1	2	1	2	2	3	2
CO3	3	3	2	3	3	1	1	1	1	2	1	3	2	3	2
CO4	3	3	3	3	2	1	1	2	1	2	1	3	3	2	3
CO5	3	3	2	2	3	1	1	2	1	2	1	2	2	2	1

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

Birla Institute of Technology, Mesra, Ranchi
Proposed Course Structure for B.Tech (AI and ML) (2024-25 onwards)
Based on NEP-2020, CBCS & OBE Model
(Circuital Branch)

Sr. No.	Semester of Study (Recommended)	Category of course	Course Code	Subjects	Mode of delivery & Credits L-Lecture; T-Tutorial;P-Practicals			Total Credits
					L (Periods / Week)	T (Periods / Week)	P (Periods / Week)	
	FIRST			THEORY				
I.1		FS (Foundation Sciences)	MA24101	Mathematics - I	3	1	0	4
I.2			CH24101	Chemistry	3	1	0	4
I.3		GE (General Engineering)	EC24101	Basic Electronics	2	1	0	3
I.4			ME24101	Basic of Mechanical Engineering	2	1	0	3
I.5		FS	CE24101	Environmental Sciences	2	0	0	2
				LABORATORIES				
I.6		FS	CH24102	Chemistry Lab	0	0	2	1
I.7		GE	EC24102	Basic Electronics Lab	0	0	2	1
I.8			ME24102	Engineering Graphics	0	0	4	2
I.9			PE24102	Workshop Practice	0	0	2	1
I.10		MC (Mandatory Course)	MC24 101/ 102 /103/ 104/105	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) /Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	22
SECOND				THEORY				
II.1		FS	MA24103	Mathematics - II	3	1	0	4
II.2			PH24101	Physics	3	1	0	4
II.3			BE24101	Biological Sciences for Engineers	2	0	0	2
II.4		GE	CS24101	Programming for Problem Solving	3	1	0	4
II.5			EE24101	Basics of Electrical Engineering	2	1	0	3
				LABORATORIES				
II.6		FS	PH24102	Physics Lab	0	0	2	1
II.7		GE	CS24102	Programming for problem Solving Lab.	0	0	2	1
II.8			EE24102	Electrical Engineering Lab.	0	0	2	1
II.9		HSS	HU24131	Communication Skill - I	0	0	3	1.5

II.10		MC	MC24 106 /107/108/109/110	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) /Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	22.5
							GRAND TOTAL FOR FIRST YEAR	44.5

Birla Institute of Technology, Mesra, Ranchi
Proposed Course Structure for B.Tech Programs (2024-25 onwards)
Based on NEP-2020, CBCS & OBE Model
(Circuital Branch)

Sr. No.	Semester of Study (Recomended)	Category of course	Course Code	Subjects	Mode of delivery & Credits L-Lecture; T-Tutorial;P-Practicals			Total Credits
				THEORY				
III.1	THIRD	PC / PE (Program Core/ Program Elective)	MA24205	Discrete Mathematics	3	0	0	3
III.2			EC24203	Digital System Design	3	0	0	3
III.3			CS24201	Data Structures	3	1	0	4
III.4			CS24203	Object Oriented Programming and Design Pattern	3	0	0	3
III.5			CS24205	Computer Organization and Architecture	3	0	0	3
III.6		HSS	MT24131	UHV-II: Understanding Harmony	3	0	0	3
		LABORATORIES						
III.7		PC/PE	EC24204	Digital System Design Lab	0	0	2	1
III.8			CS24202	DataStructures Lab	0	0	3	1.5
III.9			CS24204	OOPDP Lab	0	0	3	1.5
III.10		MC	MC24 201/202/ 203/204 / 205	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) / Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	24
	FOURTH			THEORY				
IV.1		PC/PE	CS24211	DBMS	3	1	0	4
IV.2			AI24201	Mathematics for Data Science	3	1	0	4
IV.3			CS24213	Design and Analysis of Algorithms	3	0	0	3
IV.4			AI24205	Introduction to AI	3	0	0	3
IV.5		OE (Open Elective)	XX24XXX /MO24201	Open Elective - I / MOOC - I	3	0	0	3
IV.6		GS	MA24201	Numerical Methods	2	0	0	2

IV.7			HU24211	Indian Knowledge System	2	0	0	0
		LABORATORIES						
IV.8		**PC/PE**	CS24212	DBMS Lab	0	0	3	1.5
IV.9			CS24214	Design and Analysis of Algorithms Lab	0	0	3	1.5
IV.10			AI24204	Python Programming for Data Science	0	0	3	1.5
IV.11		GS	MA24202	Numerical Methods Lab	0	0	2	1
IV.12		MC	MC24 205/206/ 207/208 / 210	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) / Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	24
GRAND TOTAL FOR SECOND YEAR								48
	FIFTH			**THEORY**				
V.1		PC / PE	CS24317	Operating System Concepts	3	0	0	3
V.2			AI24301	Basics of Supervised Learning	3	0	0	3
V.3			AI24XXX	PE-I	3	0	0	3
V.4			AI24XXX	PE-II	3	0	0	3
V.5		OE	XX24XXX / MO24301	Open Elective - II / MOOC - II	3	0	0	3
		LABORATORIES						
V.6		PC	AI24306	Data Analysis Lab	0	0	3	1.5
V.7		PC	CS24216	Shell & Kernel Programming	0	0	3	1.5
V.8		PC	AI24302	Basics of Supervised Learning Lab	0	0	3	1.5
V.9		PE	AI24XXX	PE-Lab	0	0	3	1.5
V.10		PC	AI24300	Project - I				2
							TOTAL (Theory + Labs)	23
	SIXTH			**THEORY**				
VI.1		PC / PE	CS24311	Data Communication and Computer Networks	3	0	0	3
VI.2			AI24303	Fundamental of Unsupervised Learning	3	0	0	3
VI.3			AI24305	Deep Learning	3	0	0	3
VI.4			AI24XXX	PE-III	3	0	0	3
VI.5		PC	AI24307	Modern AI	3	0	0	3
VI.6		OE	XX24XXX /MO24303	Open Elective - III / MOOC - III	3	0	0	3
VI.7		HSS	MT24304	Constitution of India	2	0	0	0

				LABORATORIES				
VI.8		PC	AI24304	Fundamental of Unsupervised Learning Lab	0	0	3	1.5
VI.9		PC	AI24306	Deep Learning Lab	0	0	3	1.5
VI.10		PC	AI24350	Project - II				2
VI.11		HSS	HU24133	Communication Skill - II	0	0	3	1.5
							TOTAL (Theory + Labs)	24.5
							GRAND TOTAL FOR THIRD YEAR	47.5
				THEORY				
VII.1	**SEVENTH**	OE	XX24XXX/ MO24401	Open Elective - IV / MOOC - IV	3	0	0	3
VII.2		PE	AI24XXX	PE-IV	3	1	0	4
VII.3		PE	AI24XXX	PE-V	3	1	0	4
				LABORATORIES				
VII.4		MC	MC24400	Summer Training (Minimum Four Weeks / 160 Hrs)				4
VII.5		PE	AI24XXX	PE Lab-IV	0	0	3	1.5
VII.6		PE	AI24XXX	PE-Lab V	0	0	3	1.5
VII.7		PC	AI24400	Project - III				3
							TOTAL (Theory + Labs)	21
VIII.1	**EIGHTH**	PC / PE	AI24450/ AI24490	Project-IV / Industry Internship				6
VIII.2		PC / PE	AI24498	Comprehensive Viva				1
							TOTAL (Theory + Labs)	7
GRAND TOTAL FOR FOURTH YEAR								28
							GRAND TOTAL	**168**

Birla Institute of Technology, Mesra, Ranchi
Proposed Course Structure for B.Tech (Computer Science and Engg.) (2024-25 onwards)
Based on NEP-2020, CBCS & OBE Model
(Circuital Branch)

Sr. No.	Semester of Study (Recommended)	Category of course	Course Code	Subjects	Mode of delivery & Credits L-Lecture; T-Tutorial; P-Practicals			Total Credits
					L (Periods/ Week)	T (Periods/ Week)	P (Periods/ Week)	
				THEORY				
I.1	FIRST	FS (Foundation Sciences)	MA24101	Mathematics - I	3	1	0	4
I.2			CH24101	Chemistry	3	1	0	4
I.3		GE (General Engineering)	EC24101	Basic Electronics	2	1	0	3
I.4			ME24101	Basic of Mechanical Engineering	2	1	0	3
I.5		FS	CE24101	Environmental Science	2	0	0	2
				LABORATORIES				
I.6		FS	CH24102	Chemistry Lab	0	0	2	1
I.7		GE	EC24102	Basic Electronics Lab	0	0	2	1
I.8			ME24102	Engineering Graphics	0	0	4	2
I.9			PE24102	Workshop Practice	0	0	2	1
I.10		MC (Mandatory Course)	MC24 101/ 102 /103/ 104/105	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) /Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	22
				THEORY				
II.1	SECOND	FS	MA24103	Mathematics - II	3	1	0	4
II.2			PH24101	Physics	3	1	0	4
II.3			BE24101	Biological Science for Engineers	2	0	0	2
II.4		GE	CS24101	Programming for Problem Solving	3	1	0	4
II.5			EE24101	Basics of Electrical Engineering	2	1	0	3
				LABORATORIES				
II.6		FS	PH24102	Physics Lab	0	0	2	1
II.7		GE	CS24102	Programming for problem Solving laboratories	0	0	2	1
II.8			EE24102	Electrical Engineering Lab.	0	0	2	1
II.9		HSS	MT24132	Communication Skill - I	0	0	3	1.5
II.10		MC	MC24 106 /107/108/109/110	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) /Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	22.5

				GRAND TOTAL FOR FIRST YEAR				44.5

Birla Institute of Technology, Mesra, Ranchi
Proposed Course Structure for B.Tech Programs (2024-25 onwards)
Based on NEP-2020, CBCS & OBE Model
(Circuital Branch)

Sr. No.	Semester of Study (Recomended)	Category of course	Course Code	Subjects	Mode of delivery & Credits L-Lecture; T-Tutorial;P-Practicals			Total Credits
				THEORY				
III.1	THIRD	PC / PE (Program Core/ Program Elective)	MA24205	Discrete Mathematics	3	0	0	3
III.2			EC24203	Digital System Design	3	0	0	3
III.3			CS24201	Data Structures	3	1	0	4
III.4			CS24203	Object Oriented Programming and Design Pattern	3	0	0	3
III.5			CS24205	Computer Organization and Architecture	3	0	0	3
III.6		HSS	MT24131	UHV-II: Understanding Harmony	3	0	0	3
		LABORATORIES						
III.7		PC/PE	EC24204	Digital System Design Lab	0	0	2	1
III.8			CS24202	DataStructures Lab	0	0	3	1.5
III.9			CS24204	OOPDP Lab	0	0	3	1.5
III.10		MC	MC24 201/202/ 203/204 / 205	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) / Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	24
	FOURTH			THEORY				
IV.1		PC/PE	CS24211	Data Base Management System	3	1	0	4
IV.2			CS24215	Operating System	3	1	0	4
IV.3			CS24213	Design and Analysis of Algorithm	3	0	0	3
IV.4			CS24219	Formal Language and Automata Theory	3	0	0	3
IV.5		OE (Open Elective)	XX24XXX /MO24201	Open Elective - I / MOOC - I	3	0	0	3
IV.6		FS	MA24201	Numerical Methods	2	0	0	2
IV.7		MC	HU24211	Indian Knowledge System	2	0	0	0
				LABORATORIES				
IV.8		PC/PE	CS24216	Shell & Kernel	0	0	3	1.5
IV.9			CS24212	DBMS Lab	0	0	3	1.5
IV.10		FS	MA24202	Numerical Methods Lab	0	0	2	1

IV.11		MC	MC24 206/ 207/208 / 209/ 210	Choice of : NCC/NSS/ PT & Games/ Creative Arts (CA) / Entrepreneurship	0	0	2	1
							TOTAL (Theory + Labs)	24
GRAND TOTAL FOR SECOND YEAR								48
V.1	FIFTH			THEORY				
V.2		PC / PE	CS24301	Compiler Design	3	0	0	3
V.3			CS24303	Data Mining Concepts and Techniques	3	0	0	3
V.4			CS24XXX	PE-I	3	0	0	3
V.5			CS24XXX	PE-II	3	0	0	3
V.6		OE	XX24XXX / MO24301	Open Elective - II / MOOC - II	3	0	0	3
		LABORATORIES						
V.7		PC	CS24302	Compiler Design Lab	0	0	3	1.5
V.8		PC	CS24306	Basic IT Workshop	0	0	3	1.5
V.9		PC	CS24304	Data Mining Concepts and Techniques lab	0	0	3	1.5
V.10		PE	CS24XXX	PE- II Lab	0	0	3	1.5
V.11		PC	CS24300	Project - I				2
							TOTAL (Theory + Labs)	23
	SIXTH			THEORY				
VI.1		PC / PE	CS24311	Data Communication and Computer Networks	3	0	0	3
VI.2			CS24313	Artificial Intelligence and Machine Learning	3	0	0	3
VI.3			CS24XXX	PE-III	3	0	0	3
VI.4			CS24315	Digital Image Processing	3	0	0	3
VI.5		OE	XX24XXX /MO24303	Open Elective - III / MOOC - III	3	0	0	3
VI.6		HSS	MT24304	Constitution of India	2	0	0	0
		LABORATORIES						
VI.7		PC	CS24312	Data Communication and Computer Networks Lab	0	0	3	1.5
VI.8		PC	CS24314	Artificial Intelligence and Machine Learning Lab	0	0	3	1.5
VI.9		PC	CS24318	Embedded Systems	0	0	3	1.5
VI.10		PC	CS24316	Digital Image Processing Lab	0	0	3	1.5
VI.11		PC	CS24350	Project - II				2
VI.12		HSS	HU24133	Communication	0	0	3	1.5

				Skill - II				
							TOTAL (Theory + Labs)	24.5
							GRAND TOTAL FOR THIRD YEAR	47.5
				THEORY				
VII.1	SEVENTH	OE	XX24XXX/ MO24401	Open Elective - IV / MOOC - IV	3	0	0	3
VII.2		PE	CS24XXX	PE-IV	3	1	0	4
VII.3		PC / PE	CS24XXX	PE-V	3	1	0	4
VII.4				LABORATORIES				
VII.5		MC	MC24400	Summer Training (Minimum Four Weeks / 160 Hrs)				4
VII.6		PE	CS24XXX	PE Lab-IV	0	0	3	1.5
VII.7		PE	CS24XXX	PE-Lab V	0	0	3	1.5
VII.8		PC	CS24400	Project - III				3
							TOTAL (Theory + Labs)	21
VIII.1	EIGHTH	PC / PE	CS24450/ CS24490	Project-IV / Industry Internship				6
VIII.2		PC / PE	CS24498	Comprehensive Viva				1
							TOTAL (Theory + Labs)	7
GRAND TOTAL FOR FOURTH YEAR								28
							GRAND TOTAL	168

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Itu Snigdh <itusnigdh@bitmesra.ac.in>

Request to Approve proposed course structure for 1st Year B.Tech Courses

Sriparna Saha <sriparna.saha@gmail.com> Fri, Jul 19, 2024 at 3:16 PM
To: Itu Snigdh <itusnigdh@bitmesra.ac.in>
Cc: "HOD Comp.Sc. & Engineering" <hod.cse@bitmesra.ac.in>, Jyotsna Kumar Mandal <jkm.cse@gmail.com>, jkmandal@klyuniv.ac.in, sriparna@iitp.ac.in

Please consider my email as approval for the first year course.
Best regards

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