Integral University Lucknow
Study & Evaluation Scheme
B. Tech. CSE(Data Science and Artificial Intelligence) in association with IBM
(w.e.f. Session: 2020-21)

Year 1st Semester – II

Sl. No.	Subject Code	Category	Subject	Periods				Evaluation Scheme				Subject Total
								Sessional			Exam.	
				L	T	P	C	CT	TA	Total	ESE	
1	CH101	BS	Chemistry	3	1	-	4	40	20	60	40	100
2	ES101	ESA	Environmental Studies	2	1	-	3	40	20	60	40	100
3	MT112	BS	Engg. Mathematics - II	3	1	-	4	40	20	60	40	100
4	ME101	ESA	Basic Mechanical Engg.	3	1	-	4	40	20	60	40	100
5	CS101	ESA	Computer Programming	3	1	-	4	40	20	60	40	100
6	CH102	BS	Chemistry Lab	-	-	2	1	40	20	60	40	100
7	ME102	ESA	Mechanical Engg. Lab	-	-	2	1	40	20	60	40	100
8	CS102	ESA	Computer Programming Lab	-	-	2	1	40	20	60	40	100
9	CS126	DC	Changing Business with Data Insight (Watson Analytics)	-	-	2	1	40	20	60	40	100
			Total	14	6	8	23	360	180	540	360	900

L-L Lecture   **T-**Tutorial   **P-**Practical   **C-**Credits   **CT-**Class Test   **TA-** Teacher Assessment

Sessional Total (CA) = Class Test + Teacher Assessment

Subject Total = Sessional Total (CA) + End Semester Examination (ESE)

BS- Basic Science   **DC-** Departmental Core

HM- Humanities   **OE-** Open Elective

DE- Departmental Elective   **ESA-** Engineering Sciences & Arts (Foundation Course & Engineering Courses

CHEMISTRY (CH-101)
(w.e.f. Session: 2015-16)

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UNIT I: Molecular theory of heterodiatomic molecules, Band theory of bonding in metals, Hydrogen bonding. Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Type of unit cell, Bragg"s Law, Calculation of density of unit cell. One and Two Dimensional solids, Graphite as two dimensional solid and its conducting properties. Fullerene and its applications.

UNIT II: Basic principles of spectroscopic methods. The use of UV, Visible, IR, ^{1}HNMR, for the determination of structure of simple organic compounds.Characteristics and classification of polymers.
Structures of the polymers: Natural and synthetic rubbers, Polyamides and polyester fibers, Polymethylmethacrylate, Polyacrylonitrile and Polystyrene. A brief account of conducting polymers (polypyrrole and polythiophene) and their applications**.**

UNIT III: Stability of reaction intermediates, *e.g.* Carbanions, Carbocations and free radicals. Types of organic reactions, and mechanism of nucleophilic substitution reactions.Mechanism of following reactions:Aldol condensation,Cannizzaro reaction, Beckmann rearrangement,Hofmann rearrangement and Diels-Alder reaction,E-Z Nomenclature. Optical isomerism of organic compounds containing one chiral center. Examples of Optically active compounds without chirality. Conformations of n-butane.

UNIT IV: Order and molecularity of reactions. First and second order reactions. Energy of activation.Phase Rule, its application to one component system (water).Equilibrium potential, electrochemical cells (galvanic and concentration cells), Electrochemical theory of corrosion and protection of corrosion.

UNIT V: Classification of fuels, Coal, Biomass and Biogas. Determination of gross and net calorific values using Bomb Calorimeter. First law of thermodynamics and its mathematical statement, heat, energy and work; Heat contentor Enthalpyof a system; Thermochemistry: Hess"s law of constant heat summation, Heat of reaction, Heatof combustion,Heatofneutralization,Heatofformation,Heatoffusion,Heatofvaporization, Heatofsublimation,Heatof solutionandHeatofdilution,Hardness of water, softening of water by Lime-Soda process,Zeolites and ion-exchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process,.

Reference Books:
1. Engineering Chemistry by Jain and Iain.
2. Engineering Chemistry by R. K. Agrawal

CHEMISTRY LAB   (CH102)
(w.e.f. Session: 2015-16)

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List of Experiments:

1. To determine the Iron content in the given iron ore by using external indicator.

2. To determine the Alkalinity in the given water sample.

3. To determine the Chloride content in the given water sample by Mohr''s Method. (Argentometric Method).

4. To determine the Percentage of Available Chlorine in the given sample of Bleaching powder iodometrically.

5. To determine the temporary and permanent hardness in water sample by Complexometric titration using EDTA as standard solution.

6. To determine the Equivalent weight of Iron by Chemical Displacement method. (The Equivalent weight of Copper is 63.5).

7. To determine the strength of given HCl solution by titrating it against NaOH solution using pH meter.
8. To determine the iron concentration in the given water sample by Spectrophotometer using potassium thiocyanate as colour developing agent.

9. To detect the presence of functional groups in the given organic compound.

10. To detect the presence of Elements in the given organic compound.

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Unit-I
Multidisciplinary nature of Environmental Science and Natural Resources

Multidisciplinary nature of Environmental studies, Scope and Importance of Environmental Science and Need of public awareness, Introduction to Natural resources, Renewable and non-renewable resources, Natural resources and associated problems.
Forest Resources
Types of forest, Use of forests, Exploitation of forests, Deforestation, Timber extraction, Mining, Dams and their effects on forests and tribal people.
Water Resources:
Use and over utilization of surface and ground water, Floods, Drought, Conflicts over water, Dams benefits and problems.
Mineral Resources:
 Use and exploitation, Environmental effects of using and extracting minerals
 Resources.
 Food Resources:
World food problems, Changes caused by agriculture and over Grazing,
Effects of modern agriculture, Fertilizer problem, Pesticide problem, Water
logging, Salinity.
Energy Resources:
Growing energy needs, Renewable energy sources, Use of alternative energy sources.
Land Resources
Land as resource, Land degradation, Man induced land slides, Soil erosion   and desertification
 Role of individual in conservation of resources, Equitable use of resources for
 sustainable life style
Unit-II
Ecosystem
Concept of Ecosystem, Structure of Ecosystem, Function of Ecosystem, Role of
Producer Consumer and Decomposer, Energy flow in an Ecosystem, Ecological
Succession, Food chain, Food web, Trophic Level, Ecological Pyramid
Different types of Ecosystem terrestrial Ecosystem
Structure and Functions of Forest Ecosystem, Structure and Functions of grassland Ecosystem, Structure and Functions of Desert Ecosystem,
Aquatic Ecosystem:
Structure and Functions of Lake Ecosystem, Structure and Functions of
Pond Ecosystem, Structure and Functions of River Ecosystem.

Unit-III
Biodiversity

Introduction of Biodiversity, Genetic Diversity, Species Diversity, Ecosystem diversity, Measurement of Bio-diversity, Bio-Geographical classification of India, Value of Bio-diversity, Consumptive & productive use values, Social, ethical, aesthetic, option values, Biodiversity at Global, National & Local levels, India as a Mega Diversity Nation, Hotspots of Biodiversity, Threats to Biodiversity, Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts,   Endangered species of India IUCN Red data book, Endemic species of India, Conservation of Biodiversity.

Unit-IV
Environmental Pollution

Introduction of Environmental Pollution
Air Pollution:
Classification of air pollutants, Causes of Air Pollution, Effects of Air Pollution, Control Measures of Air Pollution, Electrostatic precipitators, Cyclone separator, Fabric Filters
Soil Pollution:
Causes of Soil Pollution, Effects of Soil Pollution, Control Measures of Soil Pollution
Marine Pollution:
Introduction to Marine Pollution, Sources of Marine Pollution, Effects of marine Pollution, Control Measures of Marine Pollution.
Noise Pollution:
Sources of Noise Pollution, Effects of Noise Pollution, Control measures of Noise Pollution
Thermal Pollution:
Sources of Thermal Pollution, Effects of Thermal Pollution, Control measures of Thermal Pollution
Nuclear Pollution:
Introduction to Nuclear Hazards, Sources of Nuclear Hazards, Effects of nuclear Hazards, Control Measures of Nuclear Hazards
Solid Waste Management:
Sources of Urban Solid Wastes, Effects of Urban Solid Wastes Control measures of Urban Solid Wastes Causes, Effects and control measures of Industrial Wastes, Role of an Individual in prevention of pollution.
Disaster Management:
Concept of Disaster Management, Floods, Earthquake, Cyclones,   Landslides

Unit-V

Social Issues and Environment

From unsustainable development to sustainable development, Urban problems related to Energy, Water conservation, Rain water Harvesting, Water shed management, Resettlement and Rehabilitation of people, Environmental ethics, Wasteland reclamation , Consumerism and waste product.

Environmental Acts, Issues involved in Enforcement of legislation and Public Awareness:
The Environment protection Act, The Air prevention and control of Pollution Act, The Water prevention and control of Pollution Act, wildlife protection Act, Forest conservation act, Issues involved in Enforcement of Environmental Legislation, Public Awareness
Human Population and the Environment

Population growth variation among nation, Population Explosion, Environment and Human Health, Human Rights, Value Education, HIV/AIDS, Women and Child welfare, Role of Information Technology in Environment and Human Health.

BASIC MECHANICAL ENGINEERING
ME101
(Effective from Session 2017-18)

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FUNDAMENTALS OF THERMODYNAMICS
UNIT – I

Fundamental Concepts and Definitions Definition of Thermodynamics, System, surrounding and universe, Phase, Concept of continuum, Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, process, Cyclic process, Energy and its form, Work and heat, Enthalpy.   **6**

Laws of thermodynamics:
Zeroth law: Concepts of Temperature, Zeroth law.   **2**
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UNIT – II

First law: First law of thermodynamics. Concept of processes, Flow processes and control volume, Flow work, Steady flow energy equation, Mechanical work in a steady flow of process   **4**

Second law : Essence of second law, Thermal reservoir, Heat engines, COP of heat pump and refrigerator. Statements of second law, Carnot cycle, Clausius inequality.   **4**

MECHANICS AND STRENGTH OF MATERIALS
UNIT - III

Force system and Analysis:
Basic Concept: Laws of motion. Transfer of force to parallel position, Resultant of planer force system. Free Body diagrams, equilibrium and its equation.   **4**

Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry friction, belt friction.   **4**

UNIT – IV

Structure Analysis :
Beams: Introduction, Shear force and bending moment, Shear and bending moment diagram for statically determinate beams.   **8**

UNIT - V

Stress and Strain Analysis:
Simple Stress and strain: Introduction, Normal, shear stresses, Stress-strain diagrams for ductile and brittle materials   **4**

Pure Bending of Beams
Introduction, Simple bending theory.   **4**

Reference:
1. Van Wylen G.J. & Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. NY.
2. Wark Wenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY.
3. Holman, J.P.: Thermodynamics, Mc Graw Hill Book Co.NY.
4. Shames I.H., Engineering Mechanics, P.H.I.
5. D.S. Kumar, Mechanical Engineering, S.K. Katarial & Sons.
6. Bhavi Katti S.S., Engineering Mechanics, New Age Pub.
7. P.K. Bharti: Engineering Mechanics, Kataria and Sons.
8. R.K. Rajput, Mechanical Engineering, Laxmi Pub.

COMPUTER PROGRAMMING (CS101)

(w.e.f. Session: 2015-16)

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UNIT -1
Introduction to Computers: Generation of computers, Characteristic and classifications of computers.
Components of Computer: CPU, Various I/O Devices, **Memory & its types** , (Memory Hierarchy, Storage Media), Computer Software and their types, Operating System.
Computer Networks & Communication: LAN, MAN, WAN, Network Topologies, Modes of Data Communication.
Introduction to Internet and its Safeguard: Internet Addresses, Domain Name System, URL, Web Browsers Search Engines, Firewalls , Anti-Virus, **Translators**.
Algorithm and flowchart: Algorithm and flow chart characteristics, Sketching Flowcharts of various problems. [09]

Unit 2
Starting C: Standard I/O in „C‟, „C‟ Fundamental, C Character set, Constants, Variables, Keywords and Identifiers, Data types, Declaration. Operators and Expressions, Conditional statements (If, If-else), Nesting of if- else statement, switch statement, The**?:** operator, goto statement.
Decision making and Looping (While, Do-While, for), Break and Continue statements, Case Control Structures (Switch), **C programs based on above concepts**. [08]

Unit 3
Introduction to pointers: declaration and initialization of pointers, accessing the address of the variable, accessing the variable through the pointer, chain of pointers, pointers operators, pointer arithmetic
Introduction to Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value; Call by Reference; Nesting of Functions, Recursion. Pointers with function, **C program based on above concept** [09]

Unit 4
Array: Concept of One Dimensional and Multi Dimensional arrays, Declaration,
Operations: insert, delete, search, traverse, and merge, matrix operations, **Sorting**: Bubble sort, merge sort, insertion sort.
Character array and strings: declaring and initializing strings variable, reading and writing a character, reading and writing strings from terminal, Arithmetic operations on characters, string handling functions. Application of pointers, and function on array, **C program based on above concept** [10]

Unit 5
Structures: Defining Structure, Declaration of Structure Variable, Accessing Structure members, copying and comparing structure variable, operation on individual member, nesting of structures, Array of structures. Application of pointers and function on Structures.
Union Defining Union Declaration of Union, difference between structure and Union, **Introduction of Static and Dynamic memory allocation-** The process of Dynamic memory allocation, , **C program based on above concept.** [08]

References:
  1. Foundation of Information Technology by „D.S. Yadav‟- New age International
  2. Programming in „C‟ by „E Balagurusamy‟.-TMH Publication.
  3. Let us „C‟ by „Yashwant Kanitkar‟-BPB Publication.

COMPUTER PROGRAMMING LAB (CS102)

(w.e.f. Session: 2015-16)

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1. Programs based on basic concepts of C. (e.g. Addition, Subtraction, Multiplications, Swapping of numbers, Conversions, area calculation, interest calculation…etc)

2. Programs based on Conditional statement.

3. Programs based on loop Conditions (FOR, WHILE, DO- WHILE).

4. Programs based on Single & Two dimensional Array (Insertion, deletion, Multiplication, searching, etc...).

5. Programs based on Pointers.

6. Programs based on Function call (Call by value and call by reference).

7. Programs based on recursion.

8. Programs based on Strings and its operations.

9. Programs based on Structures and its operations.

10. Programs based on Miscellaneous Concepts.

PROFESSIONAL COMMUNICATION LAB (LN151)

(w.e.f. Session: 2015-16)

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Day 1. Introductions (Instructors, Students and Curriculum) Day 2. Listening exercises

Day 3. Framing Questions

Day 4. Making Small talks

Day 5. Presentation Making- tips, do‟s and don‟ts/ group presentations

Day 6. Group presentations

Day 7. Phonetic alphabet

Day 8. Phonetic transcription

Day 9. Intonation

Day 10. Stress

Day 11. Working on Negotiations

Day 12- 14 Situational conversational section- Social language, emergency situations/ seeking help, inquiries, communicating bad news

Day 15: Exercise on cross cultural communication

MECHANICAL ENGINEERING LAB
ME-102

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List of Experiments

1. To study and sketch the model of fire tube (Lancashire and Locomotive) boiler.
2. To study and sketch the model of water tube (Babcock & Wilcox) boiler.
3. To study and sketch the model of two stroke S.I. Engines.
4. To study and sketch the model of four stroke S.I. Engines.
5. To study and sketch the model of four stroke C.I. Engines.
6. To study and sketch the model of vapour compression refrigerator.
7. To study and sketch the model of simple steam engine.
8. To determine the Rockwell hardness no. of a given specimen using hardness tester.
9. To perform the tensile test on specimen and determine the different mechanical properties with the help of UTM.
10. To determine the impact strength of mild steel by Izod method using impact testing machine.
11. To perform the compression test on brick and determine the ultimate compressive strength with the help of UTM.

Integral University, Lucknow

Department of Mathematics

B. Tech. 1st year   **1st sem**

Subject: Engineering Mathematics-I (common to all branches except BT & FT)
Subject Code: MT101

(Revised w.e.f. session 2015-2016)

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Unit-I : Matrices   [8]

Introduction, Elementary row and column transformations, Rank of matrix, Linear dependence, Consistency of linear system of equations, characteristic equation, Cayley-Hamilton Theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices.

Unit II: Differential Calculus-I   [8] n^{th}
derivative, Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables.

Unit-III : Differential Calculus-II   [8] Jacobian,
Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

Unit-IV : Multiple Integrals   [8] Double and
triple integrals, Change of order of the Integration, Change of variables, Beta and Gamma functions, Application to area and volume, Dirichlet"s integral and its applications.

Unit-V : Vector Calculus   [8] Point
functions, Gradient, divergence and curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems.

Reference Books:

1. Shanti Narayan   A Text Book of Martices, S. Chand & Co.
2. Thomas/Finny   Calculus and Analytical Geometry, Narosa Pub. House.
3. B.S. Grewal   .   Higher Engineering Mathematics, Khanna Publishers,
4. Piskunov, M.   .   Differential and Integral Calculus, Moscow Peace Pub.
5. Jaggi and Mathur :   Advanced Engineering Mathematics, Khanna Pub.
6. C. Prasad   .   Mathematics for Engineers, Prasad Mudranalaya.