Integral University
STUDY & EVALUATION SCHEME
B.Tech. (CC & AI) 2nd Sem

Sl.No.	Course Category	Subject Code	Name of Subject	Periods				Evaluation Scheme				Subject Total
								Sessional (CA)			End Sem	
				L	T	P	C	CT	TA	Total	Exam (ESE)	
1	BS	CH-101	Chemistry	3	1	0	4	25	15	40	60	100
2	ES	ES-101	Environmental Studies	3	1	0	4	25	15	40	60	100
3	BS	MT-112	Mathematics – II	3	1	0	4	25	15	40	60	100
4	ESA	ME-101	Basic Mechanical Engineering	3	1	0	4	25	15	40	60	100
5	DC	CS-101	Computer Programming	3	1	0	4	25	15	40	60	100
6	BS	CH-102	Chem Lab	0	0	2	1	30	30	60	40	100
7	ESA	ME-102	ME Lab	0	0	2	1	30	30	60	40	100
8	DC	CS-102	Computer Prog. Lab	0	0	2	1	30	30	60	40	100
9	DC	CS-126	Changing Business with Data Insight (Watson Analytics)	0	0	2	1	30	30	60	40	100
				15	5	8	24	245	195	440	460	900

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 Sciences **DC** – Departmental Core

HM – Humanities **OE** – Open Elective

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

CHEMISTRY (CH-101)

L T P
3 1 0

UNIT I

1. Molecular theory of heterodiatomic molecules, Band theory of bonding in metals, Hydrogen bonding.
2. 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

1. Basic principles of spectroscopic methods. The use of UV, Visible, IR, ^{1}HNMR, for the determination of structure of simple organic compounds.
2. Characteristics and classification of polymers.
3. 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

1. Stability of reaction intermediates, *e.g.* Carbanions, Carbocations and free radicals. Types of organic reactions, and mechanism of nucleophilic substitution reactions.
2. Mechanism of following reactions.
   1.Aldol condensation (ii) Cannizzaro reaction (iii) Beckmann rearrangement (iv) Hofmann rearrangement and (v) Diels-Alder reaction.
3. 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

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

UNIT V

1. Classification of fuels, Coal, Biomass and Biogas. Determination of gross and net calorific values using Bomb Calorimeter.
2. First law of thermodynamics and its mathematical statement, heat, energy and work; Heat content or Enthalpy of a system; Thermochemistry: Hess's law of constant heat summation, Heat of reaction, Heat of combustion, Heat of neutralization, Heat of formation, Heat of fusion, Heat of vaporization, Heat of sublimation, Heat of solution and Heat of dilution (only definition and explanation).
3. 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 BOOK:
1. Engineering Chemistry by Jain and Iain.
2. Engineering Chemistry by R. K. Agrawal

ENVIRONMENTAL STUDIES (ES-101)
With effect from July, 2016

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Unit-I   **10hr**
Multidisciplinary nature of Environmental studies. Definition, Scope and Importance,
Need for public awareness.
Natural resources:
Renewable and non-renewable resources :
Natural resources and associated problems.
  a. **Forest Resources:** Use and over exploitation, deforestation, case studies.
      Timber extraction, mining, dams and their effects on forests and tribal people.
  b. **Water Resources: Use and over utilization of surface and ground water,**
      floods, drought, conflicts over water, dams- benefits and problems.
  c. **Mineral Resources:** Use and exploitation, environmental effects of extracting
      and using minerals resources, case studies.
  d. **Food Resources:** World food problems, changes caused by agriculture and
      overgrazing, effects of modern agriculture, fertilizer -pesticide problems,
      Water-logging, Salinity, case studies.
  e. **Energy Resources:** Growing energy needs, renewable and nonrenewable
      energy sources, use of alternate energy sources, case studies.
  f. **Land Resources:** Land as a resource, Land degradation, Man induced
      landslides, Soil erosion and desertification.
          - Role of an individual in conservation of natural resources
          - Equitable use of resources for sustainable life styles.

Unit-II   **8 hr**
Ecosystems
   • Concept of an Ecosystem.
   • Structure and Function of an Ecosystem.
   • Producer Consumer and decomposers.
   • Energy flow in the Ecosystem.
   • Ecological Succession.
   • Food chains, Food webs and Ecological Pyramids.
   • Introduction, types, characteristics features ,structure and   function of the
      following ecosystem:
          a- Forest Ecosystem
          b- Grassland Ecosystem
          c- Desert Ecosystem,
          d- Aquatic Ecosystem: (Ponds, streams, lakes, rivers, oceans, estuaries)

Unit-III   **8hr**
   Biodiversity and its conservation
   • Introduction - Definition: Genetic, Species and Ecosystem diversity.
   • Bio-Geographical classification of India,

ENGINEERING MATHEMATICS-II (MT 112)
(Revised w.e.f. session 2017-2018)

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Unit-I
Differential Equations [8]
Linear differential equations of first order, Linear differential equations of higher order with constant coefficients, Complementary functions and particular integrals, Solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation) .

Unit-II :
Laplace Transform [8]
Laplace transform of different types of functions, Laplace transform of derivatives and integrals, Unit step function, Laplace transform of periodic functions, Inverse Laplace transform, Convolution theorem, Applications to solve simple linear differential equations.

Unit-III :
Fourier Series and Partial Differential Equations [9]
Periodic functions, Trigonometric series , Fourier series of period 2π, Euler's formulae, Even and odd functions, Functions having arbitrary period, Change of interval, Half range sine and cosine series
Introduction of partial differential equations, Solution of second order linear homogeneous partial differential equations with constant coefficients and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples.

Unit-IV:
Applications of Partial Differential Equations [8]
Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Heat conduction equations up to two dimensions, Laplace equation.

Unit-V:
Basic Statistics and curve fitting [7]
Mean**,** Median, Mode, Standard deviation and Variance, Method of least squares, Curve fitting of straight line and parabola.

Reference Books:

1. E. Kreyszig Advanced Engineering Mathematics, Wiley Eastern Ltd.

2. Jaggi and Mathur Advanced Engineering Mathematics, Khanna Publication.

3. B. S. Grewal Higher Engineering Mathematics, Khanna Publication.

4. Dennis G. Zill Advanced Engineering Mathematics, CBS Publication.

- Value of Bio-diversity: Consumptive use, productive use, Social, ethical, aesthetic and 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 and endemic species of India
- Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-IV   **8hr**

   Environmental Pollution

  Definition
- Causes, effects and control measures of
   a) Air Pollution
   b) Water Pollution
   c) Soil Pollution
   d) Marine Pollution
   e) Noise Pollution
   f) Thermal Pollution
   g) Nuclear Hazards

- Solid Waste Management: Causes, effects and control measures of urban and Industrial Wastes.
- Role of an Individual in prevention of pollution.
- Pollution case studies
- Disaster Management: floods, earthquake, cyclones and landslides.

Unit-V   **6hr**
   Social Issues and the Environment
- From unsustainable development to sustainable development
- Urban problems related to Energy
- Water conservation, Rain water Harvesting, Watershed management
- Resettlement and Rehabilitation of people; its problems and concerns, case studies.
- Environmental ethics: issues and possible solutions
- Green house effect and global Warming, effects of acid Rain and their remedial measures and ozone Layer depletion.
- Wasteland reclamation,
- Consumerism and waste products
- **Ill-effects of fire works**

- Environment protection Act, Air (prevention and control of Pollution) Act, Water(prevention and control of Pollution) Act, wildlife protection Act, Forest conservation Act, Issues involved in Enforcement of Environmental Legislation, Public Awareness, case studies.

Human Population and the Environment
- Population growth variation among nations, Population Explosion, Family welfare programme,
- Environment and Human Health,
- Human Rights.
- Value education
- HIV/AIDS, Women and Child welfare
- Role of Information Technology in Environment and Human Health, Case studies.

Suggested field work

Visit to local area to document environment assets river/ forest/ grassland/ hill/mountain, visit to local polluted site urban/ rural/ industrial/ agricultural, study of common plants, insects, birds, study of simple ecosystems pond river, hill slopes etc.

Recommended Books:
1. Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd.Bikaner.
2. Bharaucha Erach, The Biodiversity of India, Mappin Pub. Pvt. Ltd.,Ahemdabad-380, India.
3. Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill.
4. Clark R.S. Marine Pollution, Clanderon Press Oxford (TB).
5. Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
6. De . A.K. Environmental chemistry Willey Eastern Limited.
7. Down to Earth, Centre for Science and Environment(R).
8. Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
9. Hawkins R .E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
10. Heywood, V.H. & Watson , R. T.1995.Global biodiversity Assessment .Cambridge Univ.Press 1140 p.
11. Jadhave, H. and Bhosale,V. M. 1995 Environmental protection and laws,Himalaya pub, house,Delhi.284 p.
12. Mckinnery, M.L. and School , R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
14. Miller T.G. Jr, Environmentals Ecology, W. B. Saunders Co.USA,574 p. 16 Odum,E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
15. Survey of the Environment, The Hindu (M).
16. Sharma B.K.2001.Environmental Chemistry, Goel Pub .House Meerut.

BASIC MECHANICAL ENGINEERING (ME-101)
(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

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 (CS-101)
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.
4. The C Programming Essentials by Dey- Pearson Publication.

CHEMISTRY LAB (CH-102)

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.

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.

COMPUTER PROGRAMMING LAB (CS-102)

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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.

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About Course

The new digital era asks for new interaction mechanisms On the one hand, it highlights the importance of dashboards as a summarized model of more complex realities; in the other hand, it recognizes the use of natural language as the easiest input interface for humans

Cognitive dashboards gets the best of both worlds They interact using natural language and respond with graphics and associated and filtered views following the request expressed as a text message by the user

Explore powerful visualizations of data in IBM® Cognos Analytics and discover patterns and relationships that impact businesses. Then communicate the insights that you've discovered in a dashboard and share it with others

Particulars	Hours
Unit 1 Dashboard Overview	
Dashboards Cognos Analytics dashboards: a tutorial Scenario for the tutorial Uploading data Creating a dashboard What's next in Cognos Analytics? Creating a dashboard Templates Changing the template on a tabbed dashboard	6
Unit 2: Visualization	
Creating a visualization in a dashboard Exporting a dashboard to PDF 9 Resetting a dashboard Creating multilingual dashboards Exploring your data Viewing the underlying data Changing the columns or members in a visualization Selecting columns from a different data asset Drilling up and down in your data Working with a data point Relinking data source connections Resolving ambiguous data source connections Zooming in and out	8

Visualizations Using a different visualization type Highlighting conditionally formatted data with color Showing data as points in a visualization Showing data as sizable points in a visualization Repeating a visualization by row or column Setting a timer to automatically refresh a visualization Adding a title to a visualization Limiting data to top or bottom values in a dashboard visualization Sharing visualizations Setting up drill-through 9 Adding a drill-through definition Editing a drill-through definition Widgets Adding text Adding images and shapes Adding web pages Adding video or audio Changing web pages, media, and images	

Unit 3: Filtering data

Filtering data in one visualization Highlighting data points across visualizations 9 Adding a filter widget Keeping or excluding data points in a visualization Disconnecting visualizations and filter widgets Filtering data in the current tab Filtering data in all tabs Clearing filters Removing filters	6

Unit 4: Sorting data

Sorting Sorting in numerical order Sorting in alphabetical order Calculations Creating column calculations for all visualizations Using the calculation editor Formatting Working with the legend Changing colors Stories: IBM COGNOS ANALYTICS: DASHBOARDS AND STORIES (V)	6

Unit 5: Data Preparation	

Changing the axis Improving the visibility of labels Adding labels in the visualization Changing the label orientation Connecting data points with smooth lines Changing the size or color of bubbles Working with objects Data properties Changing how data is aggregated Editing column headings Enabling data caching	6