

B.Tech. - Course Structure & Syllabus – RK24**INDUCTION PROGRAMME**

S.No.	Category	Course Name	L-T-P-C
1	MC	Physical Activities -- Sports, Yoga and Meditation, Plantation	0-0-6-0
2	MC	Career Counselling	2-0-2-0
3	MC	Orientation to all branches -- career options, tools, etc.	3-0-0-0
4	EC	Orientation on admitted Branch -- corresponding labs, tools and platforms	2-0-3-0
5	ES	Proficiency Modules & Productivity Tools	2-1-2-0
6	MC	Assessment on basic aptitude and mathematical skills	2-0-3-0
7	MC	Remedial Training in Foundation Courses	2-1-2-0
8	MC	Human Values & Professional Ethics	3-0-0-0
9	BS	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2-1-2-0
10	ES	Concepts of Programming	2-0-2-0

Group-A Branches:

Computer Science and Engineering
Computer Science and Engineering (Data Science)

Group-B Branches:

Civil Engineering,
Electrical and Electronics Engineering,
Mechanical Engineering
Electronics and Communication Engineering,
Artificial Intelligence and Machine Learning

Course Code Format:

Regulation	Branch	Year	Semester	Course Serial Number
2 Digits	2 Digits	1 Digit	1 Digit	2 Digits
24	01/02/03/04/05/44/61	1/2/3/4	1/2	01/02/03/04/...../19/20

Branch Code:

Code	Branch
01	Civil Engineering
02	Electrical & Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
44	Computer Science and Engineering (Data Science)
61	Artificial Intelligence and Machine Learning

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B. Tech. – I Year I Semester (for Group-A Branches CSE and CSE-(DS))

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051101/ 24441101	BS & H	Engineering Chemistry	3	0	0	3
2	24051102/ 24441102	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24051103/ 24441103	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
4	24051104/ 24441104	BS & H	Communicative English	2	0	0	2
5	24051105/ 24441105	Engineering Science	Introduction to Programming	3	0	0	3
6	24051106/ 24441106	BS & H	Engineering Chemistry Lab	0	0	2	1
7	24051107/ 24441107	Engineering Science	Engineering Workshop	0	0	3	1.5
8	24051108/ 24441108	BS & H	Communicative English Lab	0	0	2	1
9	24051109/ 24441109	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24051110/ 24441110	BS & H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				14	0	11	19.5

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B.Tech. – I Year I Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011111/ 24021111/ 24031111/ 24041111/ 24611111	BS & H	Engineering Physics	3	0	0	3
2	24011112/ 24021112/ 24031112/ 24041112/ 24611112	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24011113/ 24021113/ 24031113/ 24041113/ 24611113	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24011114/ 24021114/ 24031114/ 24041114/ 24611114	Engineering Science	Engineering Drawing	1	0	4	3
5	24011115/ 24021115/ 24031115/ 24041115/ 24611115	Engineering Science	Introduction to Programming	3	0	0	3
6	24011116/ 24021116/ 24031116/ 24041116/ 24611116	BS & H	Engineering Physics Lab	0	0	2	1
7	24011117/ 24021117/ 24031117/ 24041117/ 24611117	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24011118/ 24021118/ 24031118/ 24041118/ 24611118	Engineering Science	IT Workshop	0	0	2	1
9	24011119/ 24021119/ 24031119/ 24041119/ 24611119	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24011120/ 24021120/ 24031120/ 24041120/ 24611120		NSS / NCC / Scouts & Guides / Community Service	-	-	1	0.5
Total				13	0	15	20.5

B.Tech. – I Year II Semester (for Group-A Branches CSE and CSE-(DS))

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051201/ 24441201	BS & H	Engineering Physics	3	0	0	3
2	24051202/ 24441202	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24051203/ 24441203	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24051204/ 24441204	Engineering Science	Engineering Drawing	1	0	3	4
5	24051205/ 24441205	Professional Core	Data structures	3	0	0	3
6	24051206/ 24441206	BS & H	Engineering Physics Lab	0	0	2	1
7	24051207/ 24441207	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24051208/ 24441208	Engineering Science	IT Workshop	0	0	2	1
9	24051209/ 24441209	Professional Core	Data structures Lab	0	0	3	1.5
10	24051210/ 24441210		NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total				13	0	15	20.5

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B.Tech. – I Year I Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011111/ 24021111/ 24031111/ 24041111/ 24611111	BS & H	Engineering Physics	3	0	0	3
2	24011112/ 24021112/ 24031112/ 24041112/ 24611112	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24011113/ 24021113/ 24031113/ 24041113/ 24611113	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24011114/ 24021114/ 24031114/ 24041114/ 24611114	Engineering Science	Engineering Graphics	1	0	4	3
5	24011115/ 24021115/ 24031115/ 24041115/ 24611115	Engineering Science	Introduction to Programming	3	0	0	3
6	24011116/ 24021116/ 24031116/ 24041116/ 24611116	BS & H	Engineering Physics Lab	0	0	2	1
7	24011117/ 24021117/ 24031117/ 24041117/ 24611117	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24011118/ 24021118/ 24031118/ 24041118/ 24611118	Engineering Science	IT Workshop	0	0	2	1
9	24011119/ 24021119/ 24031119/ 24041119/ 24611119	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24011120/ 24021120/ 24031120/ 24041120/ 24611120		NSS / NCC / Scouts & Guides / Community Service	-	-	1	0.5
Total				13	0	15	20.5

Sl. No.	Course Code	Category	Theory	LD	T	P	Credits
1	22A0101	Engineering Science	Engineering Science	3	0	0	3
2	22A0102	Engineering Science	Engineering Science	3	0	0	3
3	22A0103	Engineering Science	Engineering Science	3	0	0	3
4	22A0104	Engineering Science	Engineering Science	3	0	0	3
5	22A0105	Engineering Science	Engineering Science	3	0	0	3
6	22A0106	Engineering Science	Engineering Science	3	0	0	3
7	22A0107	Engineering Science	Engineering Science	3	0	0	3
8	22A0108	Engineering Science	Engineering Science	3	0	0	3
9	22A0109	Engineering Science	Engineering Science	3	0	0	3
10	22A0110	Engineering Science	Engineering Science	3	0	0	3
Total				30	0	0	30

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B.Tech. – I Year II Semester (for Group-A Branches CSE and CSE-(DS))

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051201/ 24441201	BS & H	Engineering Physics	3	0	0	3
2	24051202/ 24441202	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24051203/ 24441203	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24051204/ 24441204	Engineering Science	Engineering Graphics	1	0	3	4
5	24051205/ 24441205	Professional Core	Data structures	3	0	0	3
6	24051206/ 24441206	BS & H	Engineering Physics Lab	0	0	2	1
7	24051207/ 24441207	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24051208/ 24441208	Engineering Science	IT Workshop	0	0	2	1
9	24051209/ 24441209	Professional Core	Data structures Lab	0	0	3	1.5
10	24051210/ 24441210		NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total				13	0	15	20.5

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B.Tech - 1 Year II Semester (for Group A Students) (SEE to CSE-101)

Sl. No.	Course Code	Category	Title	L	T	P	Credits
1	2401201 2441201	BT & IT	Engineering Physics	3	0	0	3
2	2401202 2441202	BT & IT	Mathematical Methods & Linear Algebra	3	0	0	3
3	2401203 2441203	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	2401204 2441204	Engineering Science	Engineering Graphics	1	0	3	4
5	2401205 2441205	Professional Core	Data Structures	7	0	0	3
6	2401206 2441206	BT & IT	Engineering Physics Lab	0	0	2	1
7	2401207 2441207	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	2401208 2441208	Engineering Science	IT Workshop	0	0	2	1
9	2401209 2441209	Professional Core	Data Structures Lab	0	0	2	1.5
10	2401210 2441210		Workshop & Community Service	-	-	1	0.5
Total				13	0	15	20.5

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B.Tech. – I Year II Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011211/ 24021211/ 24031211/ 24041211/ 24611211	BS & H	Engineering Chemistry	3	0	0	3
2	24011212/ 24021212/ 24031212/ 24041212/ 24611212	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24011213/ 24021213/ 24031213/ 24041213/ 24611213	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
4	24011214/ 24021214/ 24031214/ 24041214/ 24611214	BS & H	Communicative English	2	0	0	2
5	24011215/ 24031215 24021215 24041215 24611215	Professional Core	Engineering Mechanics Electrical Circuit Analysis – I Network Analysis Data structures	3	0	0	3
6	24011216/ 24021216/ 24031216/ 24041216/ 24611216	BS & H	Engineering Chemistry Lab	0	0	2	1
7	24011217/ 24021217/ 24031217/ 24041217/ 24611217	Engineering Science	Engineering Workshop	0	0	3	1.5
8	24011218/ 24021218/ 24031218/ 24041218/ 24611218	BS & H	Communicative English Lab	0	0	2	1
9	24011219/ 24031219 24021219 24041219 24611219	Professional Core	Engineering Mechanics Lab Electrical Circuits Lab Network Analysis Lab Data structures Lab	0	0	3	1.5
10	24011220/ 24021220/ 24031220/ 24041220/ 24611220	BS & H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				14	0	11	19.5

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Sl. No.	Course Code	Category	Lab	LD	T	P	Credits
10	24CWT202	B1 & H1	Health and Wellness: First Aid	0	0	0	0.5
	24CWT201						
	24CWT200						
9	24CWT101	Professional	Organic Chemistry Lab	0	0	0	1.5
	24CWT102						
	24CWT103						
	24CWT104						
8	24CWT105	Professional	Engineering Workshop	0	0	0	1.5
	24CWT106						
	24CWT107						
7	24CWT108	B1 & H1	Computer Graphics Lab	0	0	0	1
	24CWT109						
	24CWT110						
6	24CWT111	Professional	Engineering Workshop	0	0	0	1.5
	24CWT112						
	24CWT113						
5	24CWT114	B1 & H1	Engineering Workshop	0	0	0	1.5
	24CWT115						
	24CWT116						
4	24CWT117	B1 & H1	Engineering Workshop	0	0	0	1.5
	24CWT118						
	24CWT119						
3	24CWT120	B1 & H1	Engineering Workshop	0	0	0	1.5
	24CWT121						
	24CWT122						
2	24CWT123	B1 & H1	Engineering Workshop	0	0	0	1.5
	24CWT124						
	24CWT125						
1	24CWT126	B1 & H1	Engineering Workshop	0	0	0	1.5
	24CWT127						
	24CWT128						
Total				14	0	11	19.5

L/D	T	P	C
3	0	0	3

ENGINEERING CHEMISTRY (Common to all Branches of Engineering)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water.
- To train the students on the principles and applications of electrochemistry, polymers
- To introduce Instrumental Methods.

Course Outcomes: At the end of the course, the students will be able to:

CO1	Compare the materials of construction for battery and electrochemical sensors. Demonstrate the corrosion prevention methods and factors affecting corrosion
CO2	Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers conducting polymers. Explain calorific values, octane number, refining of petroleum and cracking of oils
CO3	Apply the principle of Band diagrams in the application of conductors and semiconductors
CO4	Summarize the concepts of Instrumental methods, Explain the principles of spectrometry, slc in separation of solid and liquid mixtures

UNIT I

Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT II

Polymers

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, PS, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers– Buna-S, Buna-N, Thiokol rubbers preparation, properties and applications. Conducting polymers– polyacetylene, polyaniline, –mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

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UN	1	1	1
UN	1	1	1
UN	1	1	1

TEACHING PLAN
(Components of Program of Engineering)

- To understand a given circuit and its operation.
- To apply the concepts of AC circuits and to design AC circuits.
- To apply the concepts of AC circuits and to design AC circuits.
- To apply the concepts of AC circuits and to design AC circuits.

Course Outcome	At the end of the course, the student will be able to
CO1	Compare the behavior of AC circuits with that of DC circuits.
CO2	Explain the operation of AC circuits and to design AC circuits.
CO3	Apply the concepts of AC circuits and to design AC circuits.
CO4	Apply the concepts of AC circuits and to design AC circuits.
CO5	Apply the concepts of AC circuits and to design AC circuits.

UNIT 1

Electrostatics and AC Fundamentals

Electrostatics: Coulomb's law, electric field, electric flux, Gauss's theorem, electric potential, capacitance, dielectric, energy stored in a capacitor, AC Fundamentals: Average value, effective value, RMS value, power in AC circuits, complex power, complex power theorem, maximum average power transfer theorem, AC bridge circuits.

UNIT 2

Polymer

Introduction to polymer, classification of polymers, properties of polymers, polymerization, polymerization reactions, polymerization mechanisms, polymerization kinetics, polymerization thermodynamics, polymerization engineering, polymerization process, polymerization reactor, polymerization control, polymerization monitoring, polymerization optimization.

UNIT III

Water Technology

Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS)and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT IV

Instrumental Methods and Applications:

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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L/D	T	P	C
0	0	2	1

ENGINEERING CHEMISTRY LAB
(Common to all Branches of Engineering)

Course Objectives:

- Verify the fundamental concepts with experiments.

Course Outcomes: At the end of the course, the students will be able to

CO1	Measure the strength of acid in Pb-Acid battery, Determine the cell constant and conductance of solutions
CO2	Prepare advanced polymer Bakelite materials
CO3	Calculate the Hardness of Water, Estimate the calcium in cement
CO4	Analyse the IR spectra of some organic compounds

List of Experiments:

1. Determination of Strength of an acid in Pb-Acid battery.
2. Estimation of Ferrous Iron by Dichrometry.
3. Preparation of a Bakelite
4. Preparation of nanomaterials by precipitation method
5. Determination of cell constant and conductance of solutions
6. Conductometric titration of strong acid vs. strong base
7. Conductometric titration of weak acid vs. strong base
8. Potentiometry - determination of redox potentials and emfs
9. Verify Lambert-Beer's law.
10. Determination of Hardness of a groundwater sample.
11. Estimation of Dissolved Oxygen by Winkler's method.
12. Estimation of Calcium in port land Cement
13. Adsorption of acetic acid by charcoal.
14. Determination of percentage Moisture content in a coal sample.
15. Wavelength measurement of sample through UV-Visible Spectroscopy
16. Identification of simple organic compounds by IR

Reference:

- "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

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LD	7	3	0
0	0	2	1

EXPERIMENTAL CHEMISTRY LAB
(Common to all Branches of Engineering)

Course Objectives:

To verify the fundamental concepts with experiments.

Course Outcome: At the end of the course, the students will be able to:

- CO1: Measure the molar weight of a solid and calculate the molar weight and composition of a solution.
- CO2: Prepare standard polymer solution and determine its molar weight.
- CO3: Calculate the hardness of water. Estimate the alkalinity in a water sample.
- CO4: Analyze the IR spectra of organic compounds.

List of Experiments:

1. Determination of molar weight of an acid by titration.
2. Estimation of iron by dichromate.
3. Estimation of a salt by gravimetry.
4. Estimation of molar weight by substitution method.
5. Determination of cell constant and conductivity of a solution.
6. Conductometric titration of a weak acid with a strong base.
7. Conductometric titration of a weak base with a strong acid.
8. Determination of the concentration of a solution by conductance.
9. Verification of Faraday's law.
10. Determination of the molar weight of a polymer by osmotic pressure.
11. Estimation of iron by dichromate.
12. Estimation of calcium by EDTA method.
13. Estimation of calcium by gravimetry.
14. Estimation of percentage of iron content in a coal sample.
15. Estimation of percentage of iron content in a coal sample by gravimetry.
16. Estimation of the molar weight of a polymer by IR.

Reference:

Vogel's Quantitative Chemical Analysis, 5th Edition, G. V. Leonard, Pearson Education, London, 1998.