Veer Bahadur Singh Purvanchal University, Jaunpur-222003

Department of Chemistry

Faculty of Engineering & Technology
(U.N.S.I.E.T)

SYLLABUS FOR

B.Tech. I Year

(SEMESTER-I &II)

ENGINEERING CHEMISTRY (BAS-102/BAS-202)

ENVIRONMENT AND ECOLOGY (BAS-104/BAS-204)

THEORY & PRACTICAL

AS PER AICTE MODEL CURRICULUM

(Effective from the Session: 2026-2027)

Approved
3.9.26
Department of Chemistry (FOET)

BOS AY: 2026-27

A. Srivastava
03.09.2026

03/09/2026

COURSE STRUCTURE & EVALUATION SCHEME FOR
B. TECH. FIRST YEAR
SEMESTER- I

3-WEEK STUDENT INDUCTION PROGRAMME at the beginning of the session													
								Evaluation Scheme					
SN	Subject Code	Subject Name	Type	Category	Period			Sessional Component		Sessional (SW) TS/PS)	End Semester Examination ESE)	Total	Credit
					L	T	P	CT	TA	CT+TA	TE/PE	SW+ESE	Cr
1.	BAS101/ BAS102	Engineering Physics/ Engineering Chemistry	T	BS	3	1	0	20	10	30	70	100	4
2.	BAS103	Engineering Mathematics-I	T	BS	3	1	0	20	10	30	70	100	4
3.	BEE101/ BEC101	Fundamentals of Electrical Engineering/ Fundamentals of Electronics Engineering	T	ES	2	1	0	20	10	30	70	100	3
4.	BCS101/ BME101	Programming for Problem Solving/ Fundamentals of Mechanical Engineering	T	ES	2	1	0	20	10	30	70	100	3
5.	BAS104/ BAS105	Environment and Ecology/ Soft Skills	T	BS/ HS	3	0	0	20	10	30	70	100	3
6.	BAS151/ BAS152	Engineering Physics Lab/ Engineering Chemistry Lab	P	BS	0	0	3	-	50	50	50	100	1
7.	BEE151/ BEC151	Basic Electrical Engineering Lab/ Basic Electronics Engineering Lab	P	ES	0	0	3	-	50	50	50	100	1
8.	BCS151/ BAS155	Programming for Problem Solving Lab/ English Language Lab	P	ES/ HS	0	0	3	-	50	50	50	100	1
9.	BCE151 / BWS151	Engineering Graphics & Design Lab/ Workshop Practice Lab	P	ES	0	1	3	-	50	50	50	100	2
					13	5	12			350	550	900	22

Abbreviation Used:

BS: Basic Science Course, **ES:** Engineering Science, **HS**: Humanities and Social Science Course, **VA**: Value-Added Course

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03.09.2026

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Unit-II

Electrochemistry and Corrosion:

Basic Concepts of Electrochemistry. Nernst's Equation and Application, EMF of the Cell, Li-Ion Battery (LIB). Introduction to Corrosion, Types, Causes and Control of Corrosions.

Spectroscopic Techniques:

Elementary Ideas of Lambert & Beer's Laws. Introduction and Application of Spectroscopic Technics (i.e., UV & IR Spectroscopy). **(8 hours)**

Unit-III

Mechanistic Concept of Organic Reactions:

Bond Fission, Free Radicals and Carbocation.

Inductive Effect, Mesomeric Effects and Electrometric Effects

Substitution Reactions:

Nucleophilic Substitution Reactions and their Mechanism (i.e., SN^1 & SN^2). **(8 hours)**

Unit-IV

Water Analysis:

Hardness of Water. Techniques for Water Softening (i.e., Lime-Soda, Zeolite & Ion Exchange).

Fuels and Combustion:

Definition, Classification, Characteristics of a Good Fuel, Calorific Values, Gross & Net Calorific Value, Determination of Calorific Value by Bomb Calorimeter, Analysis of Coal by Proximate and Ultimate Analysis Method. **(8 hours)**

Unit-V

Organic Polymers:

Classification, Preparation, Properties of PE, PVC, Polystyrene, Teflon, Buna-Rubber, Nylon-66, Buna-S and Biodegradable Polymers.

Organometallic Compounds:

General Methods of Preparation and Applications of Organometallic Compounds in Organic Synthesis **(8 hours)**

Reference Books:

1. Engineering Chemistry by Rath & Singh, 2nd Edition, Cengage Learning India Pvt Ltd, Delhi.
2. Engineering Chemistry by S. S. Dara, S Chand & Co Ltd
3. Engineering Chemistry by Jain & Jain, S.Chand & Comp, New Delhi
4. Engineering Chemistry by K. Sesha Maheswaramma, Pearson
5. Engineering Chemistry by OG Palanna, McGraw Hill Education, New Delhi
6. Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Comp, New Delhi
7. University Chemistry by BH Mahan
8. University Chemistry by CNR Rao

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BAS104-ENVIRONMENT AND ECOLOGY

B.TECH. I YEAR

SEMESTER-I

L	T	P	CT	TA	ESE	Total	Credits
3	0	0	20	10	70	100	3

Course Objectives:

1 Aims and Objectives of Environmental Education: Emphasize the Relationship Between Man and the Environment and Educate Young People about the Importance of Nature and the Environment.

2 Environmental Education Aims to Impart Ecological Knowledge and Promote Environmentally Conscious Behaviors Towards Nature.

3 It Encourages Young Minds to Take Responsibility for Protecting the Natural Environment through Information and Knowledge and to Develop Environmental Awareness.

4 . Incidentally, Promoting Awareness and a Sense of Respect for Nature Leads to a Comprehensive Understanding of the Environment and a Reasonable Attitude towards protecting it.

5 The focus of Environmental Education is Awareness, Knowledge, Attitude, Skills, Capacity Building and Participation.

Course Outcomes (COs):

	Course Outcomes (COs)	Bloom's Level
CO-1	Gain in-depth knowledge of natural processes that Sustain Life and govern the economy.	K1&K2
CO-2	Estimate and Predict the Consequences of Human Actions on the Web of Life, Global Economy and Quality of Human Life.	K3
CO-3	Develop Critical Thinking to Shape Strategies (Scientific, Social, Economic, and Legal) for Environmental Protection and the Conservation of Biodiversity, Social Equity, and Sustainable Development.	K4
CO-4	Acquire Values and Attitudes Towards Understanding Complex Environmental, Economic, and Social Challenges, and Participate Actively in Solving Current Environmental Problems and Preventing Future Ones.	K3
CO-5	Adopt Sustainability as a Practice in life and society.	K5

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Unit-1

Environment:

Definition, Types of Environments, Components of Environment, Scope and Importance.

Ecosystem:

Definition of Ecosystems, and Balance in Ecosystem.

Effects of Human Activities on Agriculture, Mining, Transportation Industries, Environmental Impact Assessment and Sustainable Development. **(8 hours)**

Unit-2

Natural Resources:

Introduction, Classification of Natural Resources:

Waterborne Diseases, Fluoride Problems in Drinking Water.

Material Cycles:

Carbon and Nitrogen Cycles.

Conventional and Non-conventional Sources of Energy. **(8 hours)**

Unit-3

Pollution and their Effects:

Water Pollution, Air Pollution, Soil Pollution, Noise Pollution.

Waste Management:

Solid waste management. **(8 hours)**

Unit-4

Current Environmental Issues of Importance:

Acid Rain, Ozone Layer and its Depletion, Population Growth

Climate Change:

Global Warming, Greenhouse Effects. **(8 hours)**

Unit-5

Environmental Protection:

Environmental Protection Act 1986, Non-Governmental Organizations (NGO's)

Human Population and the Environment:

Environmental Education, Women Education, Animal Husbandry. **(8 hours)**

Reference Books:

1 Textbook of Environment and Ecology by Dave, Katewa & Singh, 2nd Edition, Cengage Learning India Pvt Ltd Delhi.

2 Environmental Studies by S Deswal, Dhanpat Rai & Co.

3 Environmental Studies by VK Ahluwalia, 2nd Edition, TERI Press, New Delhi.

4 Environmental Studies by R Rajgopalan, Oxford University Press.

5 Environment & Ecology by Singh & Malviya, Acme Learning

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03.09.2026

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BAS152-ENGINEERING CHEMISTRY LAB.

B.TECH. FIRST YEAR

SEMESTER-I

Course Outcomes: At the end of this course, students will demonstrate the ability to:

CO1	Use of different analytical instruments	K3
CO2	Measure molecular/system properties such as strength, equivalent weight, surface tension, viscosity	K5
CO3	Calculate reaction rate kinetics, solubility, and acidity of a given sample	K4
CO4	Calculate the velocity constant of the reaction	K4

L	T	P	PS	PE	Total (s)	Credits
0	0	03	20	30	50	1

Experiment No. 1: To determine the relative and absolute **Viscosity** of a given liquid at room temperature by using the "**Ostwald Viscometer**" method.

Experiment No. 2: To determine the **Surface Tension of** a given liquid at room temp using a "**Stalagnometer**" by drop number method.

Experiment No. 3: To determine the kinetics of dissolution of Magnesium metal (Ribbon) in dil. HCl.

Experiment No. 4: To determine the strength in gm/Lit. of the given NaOH solution with the help of the standard Oxalic Acid solution.

Experiment No. 5: To determine the **Equivalent weight** of the given Organic Acid.

Experiment No. 6: To determine the kinetics of the decomposition of **Sodium Thiosulphate** ($Na_2S_2O_3$) by mineral acid.

Experiment No. 7: To determine the **Acid value in** the given Oil sample.

Experiment No. 8: To determine the acidity of the Water sample.

Experiment No. 9: To determine the **Velocity constant of** the reaction of decomposition of H_2O_2.

Experiment No. 10: To determine the **Velocity constant of** hydrolysis of Ethyl Acetate with NaOH.

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A. Sirajto.. 03.09.2026

03/09/2026

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COURSE STRUCTURE & EVALUATION SCHEME FOR
B. TECH. FIRST YEAR
SEMESTER- II

SN	Subject Code	Subject Name	Type	Category	Period			Evaluation Scheme					Credit
								Sessional Component		Sessional (SW) TS/PS)	End Semester Examination ESE)	Total	
					L	T	P	CT	TA	CT+TA	TE/PE	SW+ESE	Cr
1.	BAS202/ BAS201	Engineering Chemistry / Engineering Physics	T	BS	3	1	0	20	10	30	70	100	4
2.	BAS203	Engineering Mathematics-II	T	BS	3	1	0	20	10	30	70	100	4
3.	BEC201/ BEE201	Fundamentals of Electronics Engineering / Fundamentals of Electrical Engineering	T	ES	2	1	0	20	10	30	70	100	3
4.	BME201/ BCS201	Fundamentals of Mechanical Engineering/ Programming for Problem Solving	T	ES	2	1	0	20	10	30	70	100	3
5.	BAS205/ BAS204	Soft Skills / Environment and Ecology	T	HS/ BS	3	0	0	20	10	30	70	100	3
6.	BAS252/ BAS251	Engineering Chemistry Lab / Engineering Physics Lab	P	BS	0	0	3	-	50	50	50	100	1
7.	BEC251/ BEE251	Basic Electronics Engineering Lab/ Basic Electrical Engineering Lab	P	ES	0	0	3	-	50	50	50	100	1
8.	BAS255/ BCS251	English Language Lab / Programming for Problem Solving Lab	P	HS/ ES	0	0	3	-	50	50	50	100	1
9.	BWS251/ BCE251	Workshop Practice Lab / Engineering Graphics & Design Lab	P	ES	0	1	3	-	50	50	50	100	2
10.	BVA251/ BVA252	Sports and Yoga / NSS	P	VA	0	0	3		100	*100		*100	0
					13	5	12+ 3*			350+ *100	550	900+ *100	22

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03.09.2026

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COURSE STRUCTURE & EVALUATION SCHEME FOR
B. TECH. FIRST YEAR
SEMESTER- II

SN	Subject Code	Subject Name	Type	Category	Period			Evaluation Scheme					Credit
								Sessional Component		Sessional (SW) TS/PS)	End Semester Examination ESE)	Total	
					L	T	P	CT	TA	CT+TA	TE/PE	SW+ESE	Cr
1.	BAS202/ BAS201	Engineering Chemistry / Engineering Physics	T	BS	3	1	0	20	10	30	70	100	4
2.	BAS203	Engineering Mathematics-II	T	BS	3	1	0	20	10	30	70	100	4
3.	BEC201/ BEE201	Fundamentals of Electronics Engineering / Fundamentals of Electrical Engineering	T	ES	2	1	0	20	10	30	70	100	3
4.	BME201/ BCS201	Fundamentals of Mechanical Engineering/ Programming for Problem Solving	T	ES	2	1	0	20	10	30	70	100	3
5.	BAS205/ BAS204	Soft Skills / Environment and Ecology	T	HS/ BS	3	0	0	20	10	30	70	100	3
6.	BAS252/ BAS251	Engineering Chemistry Lab / Engineering Physics Lab	P	BS	0	0	3	-	50	50	50	100	1
7.	BEC251/ BEE251	Basic Electronics Engineering Lab/ Basic Electrical Engineering Lab	P	ES	0	0	3	-	50	50	50	100	1
8.	BAS255/ BCS251	English Language Lab / Programming for Problem Solving Lab	P	HS/ ES	0	0	3	-	50	50	50	100	1
9.	BWS251/ BCE251	Workshop Practice Lab / Engineering Graphics & Design Lab	P	ES	0	1	3	-	50	50	50	100	2
10.	BVA251/ BVA252	Sports and Yoga / NSS	P	VA	0	0	3		100	*100		*100	0
					13	5	12+ 3*			350+ *100	550	900+ *100	22

Abbreviation Used:

BS: Basic Science Course, **ES:** Engineering Science, **HS**: Humanities and Social Science Course, **VA**: Value-Added Course

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03.09.2026

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BAS 202-ENGINEERING CHEMISTRY

B.TECH. FIRST YEAR

SEMESTER-II

L	T	P	CT	TA	ESE	Total	Credits
3	1	0	20	10	70	100	4

Course Objectives:

1 To enable the students to understand the Chemistry of Atomic and Molecular structure, Chemistry of advanced Materials, Nanomaterials, Graphite & fullerene.
2 . To enable the students to understand the concept of Electrochemistry, Corrosion, and the detailed concepts of spectroscopic techniques.
3 To enable the students to understand the mechanistic concept of the reactions.
4 To enable the students to understand and apply detailed concepts of water source, water impurities, hardness of water, and analysis of coal & determination of calorific values.
5 To enable the students to understand detailed concepts related to polymers and Organometallic compounds.

Course Outcomes (COs):

Units	Course Outcomes (COs)	Bloom's Level
CO-1	Get an understanding of the theoretical principles of chemistry of molecular structure, bonding and properties, and chemistry of advanced materials.	K1&K3
CO-2	Apply the fundamental concepts of structural determination using various spectral techniques and spectroscopy.	K2&K4
CO-3	Mechanistic concept of organic reaction, stability and effects of reaction intermediates. Substitution reactions and their mechanism.	K5
CO-4	Develop an understanding of the sources, impurities, and hardness of water; apply the concepts of determining calorific values; and analyse coal.	K2& K3
CO-5	Develop the understanding of the chemical structure of polymers and its effect on their various properties when used as engineering materials. Understanding the applications of specific polymers and Chemistry applicable in organic synthesis.	K1& K3

Unit-I

Atomic and Molecular Structure:

Atomic Orbitals, Modern Concept of Chemical Bonding, Sigma & Pi Bonds, Molecular Orbital Theory (MOT). Important Features, LCAO Methods, Molecular Energy Level Diagram of Homo-nuclear Diatomic Molecules (e.g., N_2, O_2), Magnetic Properties and Bond Order, Hydrogen Bonding in a Biological System.

Solid State Materials:

Elementary Ideas of Solid State, Band Theory of Solids, Unit Cell (Cubic System), Point Defects in Solid, Techniques for Structure Determination of Solid Material (e.g., Bragg's Equation). Structure and use of Graphite.

(8 hours)

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Unit-II

Electrochemistry and Corrosion:

Basic Concepts of Electrochemistry. Nernst's Equation and Application, EMF of the Cell, Li-Ion Battery (LIB). Introduction to Corrosion, Types, Causes and Control of Corrosions.

Spectroscopic Techniques:

Elementary Ideas of Lambert & Beer's Laws. Introduction and Application of Spectroscopic Technics (i.e., UV & IR Spectroscopy). **(8 hours)**

Unit-III

Mechanistic Concept of Organic Reactions:

Bond Fission, Free Radicals and Carbocation.

Inductive Effect, Mesomeric Effects and Electrometric Effects

Substitution Reactions:

Nucleophilic Substitution Reactions and their Mechanism (i.e., SN^1 & SN^2). **(8 hours)**

Unit-IV

Water Analysis:

Hardness of Water. Techniques for Water Softening (i.e., Lime-Soda, Zeolite & Ion Exchange).

Fuels and Combustion:

Definition, Classification, Characteristics of a Good Fuel, Calorific Values, Gross & Net Calorific Value, Determination of Calorific Value by Bomb Calorimeter, Analysis of Coal by Proximate and Ultimate Analysis Method. **(8 hours)**

Unit-V

Organic Polymers:

Classification, Preparation, Properties of PE, PVC, Polystyrene, Teflon, Buna-Rubber, Nylon-66, Buna-S and Biodegradable Polymers.

Organometallic Compounds:

General Methods of Preparation and Applications of Organometallic Compounds in Organic Synthesis **(8 hours)**

Reference Books:

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2. Engineering Chemistry by S. S. Dara, S Chand & Co Ltd
3. Engineering Chemistry by Jain & Jain, S.Chand & Comp, New Delhi
4. Engineering Chemistry by K. Sesha Maheswaramma, Pearson
5. Engineering Chemistry by OG Palanna, McGraw Hill Education, New Delhi
6. Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Comp, New Delhi
7. University Chemistry by BH Mahan
8. University Chemistry by CNR Rao

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BAS204-ENVIRONMENT AND ECOLOGY

B.TECH. I YEAR

SEMESTER-II

L	T	P	CT	TA	ESE	Total	Credits
3	0	0	20	10	70	100	3

Course Objectives:

1 Aims and Objectives of Environmental Education: Emphasize the Relationship Between Man and the Environment and Educate Young People about the Importance of Nature and the Environment.

2 . Environmental Education aims to Impart Ecological Knowledge and promote environmentally conscious behavior towards nature.

3 It Encourages Young Minds to Take Responsibility for Protecting the Natural Environment through Information and Knowledge and to Develop Environmental Awareness.

4 Incidentally, Promoting Awareness and a Sense of Respect for Nature Leads to a Comprehensive Understanding of the Environment and a Reasonable Attitude towards protecting it.

5 The focus of Environmental Education is Awareness, Knowledge, Attitude, Skills, Capacity Building and Participation.

Course Outcomes (COs):

	Course Outcomes (COs)	Bloom's Level
CO-1	Gain in-depth knowledge of natural processes that Sustain Life and govern the economy.	K1&K2
CO-2	Estimate and Predict the Consequences of Human Actions on the Web of Life, Global Economy and Quality of Human Life.	K3
CO-3	Develop Critical Thinking to Shape Strategies (Scientific, Social, Economic, and Legal) for Environmental Protection and the Conservation of Biodiversity, Social Equity, and Sustainable Development.	K4
CO-4	Acquire Values and Attitudes Towards Understanding Complex Environmental, Economic, and Social Challenges, and Participate Actively in Solving Current Environmental Problems and Preventing Future Ones.	K3
CO-5	Adopt Sustainability as a Practice in life and society.	K5

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03.09.2026

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3.9.26

Unit-1

Environment:

Definition, Types of Environments, Components of Environment, Scope and Importance.

Ecosystem:

Definition of Ecosystems, and Balance in Ecosystem.

Effects of Human Activities on Agriculture, Mining, Transportation Industries, Environmental Impact Assessment and Sustainable Development. **(8 hours)**

Unit-2

Natural Resources:

Introduction, Classification of Natural Resources:

Waterborne Diseases, Fluoride Problems in Drinking Water.

Material Cycles:

Carbon and Nitrogen Cycles.

Conventional and Non-conventional Sources of Energy. **(8 hours)**

Unit-3

Pollution and their Effects:

Water Pollution, Air Pollution, Soil Pollution, Noise Pollution.

Waste Management:

Solid waste management. **(8 hours)**

Unit-4

Current Environmental Issues of Importance:

Acid Rain, Ozone Layer and its Depletion, Population Growth

Climate Change:

Global Warming, Greenhouse Effects. **(8 hours)**

Unit-5

Environmental Protection:

Environmental Protection Act 1986, Non-Governmental Organizations (NGO's)

Human Population and the Environment:

Environmental Education, Women Education, Animal Husbandry. **(8 hours)**

Reference Books:

1 Textbook of Environment and Ecology by Dave, Katewa & Singh, 2nd Edition, Cengage Learning India Pvt Ltd Delhi.

2 Environmental Studies by S Deswal, Dhanpat Rai & Co.

3 Environmental Studies by VK Ahluwalia, 2nd Edition,TERI Press, New Delhi.

4 Environmental Studies by R Rajgopalan, Oxford University Press.

5 Environment & Ecology by Singh & Malviya, Acme Learning

A. Sivaraju
03.09.2026

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BAS252-ENGINEERING CHEMISTRY LAB.

B.TECH. FIRST YEAR

SEMESTER-II

Course Outcomes: At the end of this course, students will demonstrate the ability to:

L	T	P	C	CAT	TA	CT	PE	CT+TA	Total (s)	Credits
0	0	3	P	BS	50	0	50	50	100	1

COURSE OUTCOMES (Cos)

CO1	Use of different analytical instruments	K3
CO2	Measure molecular/system properties such as strength, equivalent weight, surface tension, viscosity	K5
CO3	Calculate reaction rate kinetics, solubility, and acidity of a given sample	K4
CO4	Calculate the velocity constant of the reaction	K4

LIST OF EXPERIMENTS

1. To determine the relative and absolute **Viscosity** of a given liquid at room temperature by using the **"Ostwald Viscometer"** method.
2. To determine the **Surface Tension of** a given liquid at room temp using a **"Stalagnometer"** by drop number method.
3. To determine the kinetics of dissolution of Magnesium metal (Ribbon) in dil. HCl.
4. To determine the strength in gm/Lit. of the given NaOH solution with the help of the standard Oxalic Acid solution.
5. To determine the **Equivalent weight** of the given Organic Acid.
6. To determine the kinetics of the decomposition of **Sodium Thiosulphate** ($Na_2S_2O_3$) by mineral acid.
7. To determine the **Acid value in** the given Oil sample.
8. To determine the acidity of the Water sample.
9. To determine the **Velocity constant of** the reaction of decomposition of H_2O_2.
10. To determine the **Velocity constant of** hydrolysis of Ethyl Acetate with NaOH.

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