Estd. 1962
"A++" Accredited by NAAC(2021) With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
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शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी विभाग २३१–२६०९०९३/९४

SU/BOS/Science/ 71 **Date: 15 / 11 / 2022**

To,
The Principal,
All Affiliated Concerned Science Colleges/Institutions
Shivaji University, Kolhapur.

Subject :- Regarding syllabi of M.Sc. & B. Sc. Part- I (NEP-2020) degree programme under the Faculty of Science and Technology as per National Education Policy 2020 .

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi and Nature of question paper of **M.Sc. & B. Sc. Part -I** under the Faculty of Science and Technology **as per National Education Policy 2020 .**

Sr.No.	Faculty of Science and Technology	Programme/ Course
1	Chemistry and Chemical Engineering	M.Sc. Part-I Alcohol Technology (Entire)
		M.Sc. Part-I Sugar Technology (Entire)
		M.Sc. Part-I, AGPM,
		B.Sc. Part-I Sugar Technology (Entire)

This syllabi and nature of question paper shall be implemented from the Academic Year **2022-2023** onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in (students Online Syllabus)

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

Copy to:

1	The Dean, Faculty of Science & Technology	7	Appointment Section
2	Director, Board of Examinations and Evaluation	8	P.G.Seminar Section
3	The Chairman, Respective Board of Studies	9	Computer Centre (I.T.)
4	B.Sc. Exam	10	Affiliation Section (U.G.)
5	Eligibility Section	11	Affiliation Section (P.G.)
6	O.E. I Section	12	P.G.Admission Section

SHIVAJIUNIVERSITYKOLHAPUR

CHOICE BASED CREDIT SYSTEM

Syllabus

for

B.Sc.Part-I

SugarTechnology(Entire)

(UnderFacultyofScience&Technology)

AS PER NEP - 2020

(TobeimplementedfromAcademicYear2022 - 23)

B.Sc. I Programme Structure (2022 - 23)

SEMESTER-I(Duration-SixMonth)																	
	Sr. No.	Course Code	TEACHINGSCHEME						EXAMINATION SCHEME								
			THEORY			PRACTICAL			Universityassessment (UA)			InternalAssessment (IA)and Practical			PRACTICAL		
			Lectures (Perweek)	Hours (Perweek)	Credit	Lectures (Perweek)	Hours (Perweek)	Credit	Maximum Marks	Minimum Marks	Exam Hours	Maximum Marks	Minimum Marks	Exam Hours	Maximum Marks	Minimum Marks	
CGPA	1	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1	**PRACTICALEXAMINATIONISANNUAL**		
	2	DSC-ST			2				40	14	2	10	4	1			
	3	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1			
	4	DSC-ST			2				40	14	2	10	4	1			
	5	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1			
	6	DSC-ST			2				40	14	2	10	4	1			
	7	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1			
	8	DSC-ST			2				40	14	2	10	4	1			
	9	AECC-A	4	3.2	4	4	---	---	40	14	2	10	4	1			
	10	SDC-A	4	3.2	2	4	---	---	40	14	2	10	4	1			
		Total(A)	**28**	**22.4**	**22**	**24**	**12.8**	**8**	**400**			**100**					
SEMESTER-II(Duration-SixMonth)																	
CGPA	1	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1	50	18	
	2	DSC-ST			2				40	14	2	10	4	1			
	3	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1	50	18	
	4	DSC-ST			2				40	14	2	10	4	1			
	5	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1	50	18	
	6	DSC-ST			2				40	14	2	10	4	1			
	7	DSC-ST	5	4	2	4	3.2	2	40	14	2	10	4	1	50	18	
	8	DSC-ST			2				40	14	2	10	4	1			
	9	AECC-B	4	3.2	4	4	---	---	40	14	2	10	4	1	---	---	
	10	SDC-B	4	3.2	2	4	---	---	40	14	2	10	4	1	---	---	
Total(B)			**28**	**22.4**	**22**	**24**	**12.8**	**8**	**400**			**100**			**200**		
Grand Total (A+B)			56	44.8	**44**	**48**	**25.6**	**16**	**800**			**200**			**200**		

• Studentcontacthoursperweek:**48**Hours(Min.)	• TotalMarksforB.Sc.-I :**1200**

• TheoryandPracticalLectures :**48**Minutes Each	• TotalCreditsforB.Sc.-I (SemesterI&II):**60**
DSC–DisciplineSpecificCore Course:Allpapersarecompulsory.	
AECC–AbilityEnhancementCompulsoryCourse(A& B)-English	
SDC – Skill Development Course:	
PracticalExaminationwillbeconductedannuallyfor50Markspercourse(subject).	
Thereshall beseparatepassingfortheoryandpracticalcourses.	

B.Sc. I:SugartechnologyEntire:Listofcourses:

i) B.Sc.Part1(SemI&II)

Course Code	NameofCourse	CourseCode	NameofCourse
SemI		**SemII**	
DSCST1	AppliedChemistry–I (Sugarchemistry)	**DSCST9**	AppliedChemistry–III (Organicchemistry)
DSCST2	AppliedChemistry–II (Biochemistry)	**DSCST10**	AppliedChemistry–IV (Physicalchemistry)
DSCST3	AppliedPhysics-I (PropertiesofMaterial&Thermodynamics)	**DSCST11**	AppliedPhysics-III(BasicInstrumentation)
DSCST4	AppliedPhysics-II (Optics&Crystallography)	**DSCST12**	AppliedPhysics-IV (SugarInstrumentation)
DSCST5	AppliedMathematics-I (Algebra&Geometry)	**DSCST13**	AppliedMathematics -III (DescriptiveStatistics)
DSCST6	AppliedMathematics -II (DifferentialIntegration& calculus)	**DSCST14**	AppliedMathematics -IV (ProbabilityTheory)
DSCST7	SugarcaneAgriculture–I (SugarcaneAgronomy)	**DSCST15**	SugarcaneAgriculture–III (SugarcaneAgronomy)
DSCST8	SugarcaneAgriculture–II (SugarcanePathology)	**DSCST16**	SugarcaneAgriculture–IV (SugarcanePathology)
AECC–A	English–I	**AECC–B**	English–II

Practical

DSCSTP1	Practical inChemistry based on Paper ItoIV	**DSCSTP3**	Practical inSugarCaneAgriculturebased on Paper ItoIV
DSCSTP2	Practical inApplied Physics based on Paper ItoIV	**DSCSTP4**	Practical inAppliedMathematicsbased on Paper ItoIV

Semester –I
Subject: Applied Chemistry: I (ST1)
(Sugarchemistry)

UNIT:01 - Carbohydrates: [15]

- Introduction – Etymology, History: accent time, middle age & modern. Chemistry of sugar, Constituents of sugar, Natural polymers of sugars, Flammability of sugar. Types of sugar, Monosaccharide's – Glucose, Fructose, Disaccharides –sucrose, lactose & maltose.
- Forms of sugar and its use. Health effects of sugar- Blood glucose level - Obesity and Diabetics, Cardiovascular disease- Alzheimer's disease Tooth decays – Addiction forming Hyper activity- Measurement.
- Introduction and Classification of Carbohydrates with suitable examples.
- Reactions of Monosaccharide such as a) Mutarotation b) Alkaline degradation c) Rearrangements d) Acidic degradation e) Polymerisation f) Caramelisation.
- Di & Polysaccharides:Structures and properties of sucrose, Maltose, Lactose, Starch & Cellulose (chain structures)

UNIT :02 - Structure And Properties of Sugar: [15]

- Physical & Chemical properties of sugar**.**
- Physical properties of sucrose-structure of sucrose molecule, sucrose derivative, decomposition of sucrose.
- Chemical properties of sucrose, sucrose molecule, crystalline sucrose, amorphous sucrose, aqueous sucrose. Solution (solubility, density, viscosity, surface tension, boiling point, freezing point, rotation of polarized light)
- Physical properties of reducing sugar: Physical properties of reducing sugar (dextrose &laevulose) solubility, density, refractive index, optical rotation.
- Chemical properties of reducing sugar (dextrose & laevulose) with organic reagent: Acetone, benzoic, carbonate, acetate. With inorganic reagent: Phosphate sodium, chloride salt, calcium levitates.
- Decomposition reaction with alkaline, solution & acid solution, oscillation reaction with iodine.

Subject: Applied Chemistry: II (ST2)
(Bio Chemistry)

UNIT:01 – Biomolecules: [15]

- Introduction to living cells, classifications of living cells, structure and functionof cells, Structure and typical characteristics of DNA & RNA.
- Proteins: Characteristics and classifications of proteins, protein structure, proteins in sugarcane juice.
- Amino acids: Classifications and properties, Amino acids in sugarcane juice and molasses.

UNIT :02 - Carbohydrate Metabolism And Enzymology: [15]

- Carbohydrate metabolism: Glycolysis, Tri Carboxilic Acid (TCA) cycle, Pentose phosphate pathway, Glyoxylate cycle.
- Enzymes: Definition, classification, mechanism of enzyme action, factors affecting reactivity, industrial applications of enzyme

Reference Books :

1	Organic Chemistry	:	Hendrickson, cram, Hammond
2	Organic Chemistry	:	Morrison & Boyd
3	Organic Chemistry	:	Volume I & II I.L.Finar
4	Organic Chemistry	:	Pine
5	Advanced Organic Chemistry	:	Sachin kumar Ghosh
6	Advanced Organic Chemistry	:	B.S.Bahl&ArunBahi
7	A guide book to Mechanism in organic chemistry	:	Peter Sykes
8	Stereochemistry of organic Compounds	:	Kalsi
9	Stereochemistry of Carbon Compounds	:	Eliel
10	Text book of organic chemistry	:	P.L.Soni
11	Text book of practical organic Chemistry	:	A.I.Vogel
12	Advanced organic chemistry	:	Reactions, Mechanism & Structure Jerry March
13	Organic Chemistry	:	M.R.Jain
14	Organic Chemistry	:	J.M.Shaigel

Applied Physics I
(Properties of Material)

Unit: 01

Surface Tension [15]

Explanation of surface tension, angle of contact and wettability, relation between surface tension, excess of pressure and radius of curvature, excess pressure in soap bubble and rise of liquid in capillary, effect of surface tension on evaporation and condensation, effect of impurity and temperature on surface tension.

Fluid Dynamics and Viscosity

General concept of fluid flow, streamline and turbulent flow, the equation of continuity, Bernoulli's equation, coefficient of viscosity, flow of liquid through the capillary tube, poiseuille's, Searle's viscometer, determination of viscosity by Ostwald's viscometer.

Unit: 02 Kinetic Theory of Gases[15]

Mean free path of molecule and its calculation, ideal and real gases, deviation from ideal gas(Boyle's law), Vander Waal's equation for real gas, interpretation of temperature, Andrew's curve, critical constants and their relation with Vander Waal's constants, reduced equation of state.

Oscillations

Simple harmonic motion, Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations, Forced oscillations.

Applied Physics II **(DSC ST3)**

(optics& Crystallography)

Unit :01 Diffraction[15]

Types of diffraction, plane diffraction grating, construction, theory and its application to determine wavelength of light, resolving power, power of plane diffraction grating.

Polarization

Idea of polarization, polarization by reflection, Brewster's Law, polarization by refraction, pile of plates, double refraction, Huygens's experiment of refraction, Nicol prism, optical rotation- law of rotation of plane of polarization, half shade polarimeter.

Unit:02 Laser and Optical Fiber[15]

Interaction of radiation with matter- absorption, spontaneous and stimulated emission, meta-stable state, pumping, population inversion, types of lasers, properties of lasers, uses of laser, types of optical fibers, properties of fiber, fiber optics communication system.

Crystallography

Space lattice, basis and crystal structure, unit cell, co-ordination number, packing fraction, calculation of lattice constants, miller indices of plane, relation between interplanar spacing and miller indices, Bragg's law, Bragg's X-ray spectrometer, X- ray diffraction.

Reference Books:

1) Physics: S.G. Starling &Woodlal, Longmamas& green co. Ltd.

2) Textbook of properties of matter: N.S. Khare& S. Kumar, Atmaram& sons, New Delhi.

3) Physics Vol. I & II: Resnik & Halliday, Willey Ester ltd. New Delhi.

4) Treaties on heat: Shah & Shrivastava.

5) Kinetic Theory of gases: V.N. Kelkar

6) Heat & thermodynamics: Brijlal&Subramananyam, S. Chand & Co. Ltd

7) Geometrical & Physical optics :D.S.Mathur

8) Textbook of optics (New Edition) :Brijlal&Subramananyam

9) Fundamentals of optics: Jenkins & White 10) Optics (Second Edition): Ajay Ghatak

Subject: Applied Mathematics: I (DSC ST5)
(Algebra and Geometry)

UNIT :01 - General equation Theory: [15]

General equation of place, normal form intercept form, two parallel planes,
Angle between two planes.
Equation of a plane, passing through a point. Direction of normal to the plane, plane passing through three points. Distance of a point from plane, straight line in three dimensional.
Equation of straight-line symmetric form of equation of straight line Inter section of line & plane line passing through a point at perpendicular to given plane. Intersection of two lines, image of a point in a plane.
Trigonometric ratios: Trigonometric ratios of some standard angles. Trigonometric identities & their derivations.

UNIT:02 - Determinants and Matrices: [15]

Evaluation of determinants. Fundamental properties of determinants.
Cramer's rule. Solutions of homogeneous & non-homogeneous equations. Types of matrices. Algebra of matrices, multiplication of matrices. Inverse of a matrix, application of matrices to solve system of simultaneous equations. Rank of a matrix. Function Types of functions. Algebraic functions, exponential functions, trigonometric functions, logarithmic functions.
Algebra of functions. Increasing & decreasing functions. Concept of limit. Limit of a function.
Algebra of limits. Method of evaluation of limits. Evaluation of limit of a function at infinity. Continuity of a function.

Subject: Applied Mathematics: II (DSC ST6)
(Differential and Integration Calculus)

UNIT:01 - Derivative of a function.: [15]

Derivative of some standard functions from first principle. Algebra of derivatives, rules of differentiation with regards to sum, product, difference & quotient of two functions.
Derivative of some simple composite function, chain rules. Second order derivatives. Maxima & minima of a function of single variable and two variables. Application of derivatives tangent & normal, velocity & acceleration.
Integration: Integration of a given function & method of evaluation of integrals. Definite & indefinite integrals. Geometrical interpretation of definite integral as area & volume of revolution under respective curves. Length of a curve.

UNIT:02 - Differential equations: [15]

Variable separable form, homogeneous & non- homogeneous differential equations. Exact differential equation, linear differential equation of first order. Bernoulli form of differential equation. Application of Differential equations Law of growth & decay,

Newton's law of cooling, orthogonal trajectories of curves, Chemical reactions & solutions. Conduction of heat.

Reference Books:

1) Analytical Geometry of two dimensions: R.M. Khan, Allied pub, Colkatta.
2) A text book of Matrices: Shantinarayan, S. Chand & company, New Delhi.
3) A text book of Engineering Mathematics : N.P. Bali, S. Chand & company, New Delhi.
4) Differential Calculus: shantinarayan, S. Chand & company, New Delhi.
5) Algebra & Geometry: H.V. Kumbhojkar, NiraliPrakashan.
6) Ordinary & Partial Differential Equations :M.D.Raisinghania Analytical, S. Chand & company, New Delhi.
7) Differential Equations: H.V. Kumbhojkar, NiraliPrakashan.
8) Differential Equations: Agashe
9) Integral Calculus: Shantinarayan, S. Chand & company, New Delhi.
10) A text book of Engineering Mathematics: N.P. Bali, Manish Goyal, Laxmi publication

Subject: Sugar Cane Agriculture: I (DSC ST7)
(Sugar cane cultivation & agronomy)

UNIT:01- Introduction: [15]

Origen of Cane, cultivation in India, varieties, climatic conditions, sugarcane agro climatic zones in India. Maharashtra state statistics of cane. Sugar cane pricing and payment,, cane as bio- fuel. Internal and external morphology of cane Cultivation practices.

Soil: Types, properties – Visual & morphological properties, analytical properties, Fertility & soil problems, sustaining fertility, soil conservation practices,

Planting: Preparatory tillage, planting time, selection of seed cane, methods of planting - Flat, ridges & furrows, trench, IISR 86206, ring, spaced Trans planting & polybag seedling

Weeds: common weeds, aquatic weeds ,loss due to weeds , method to weed control (mechanical, manual &biological) integrated weed management. Measure to reduced weed.

Growth of Sugarcane: Germination, development of shoot & root - factors affecting, Tillering, growth of leaves, internodes & stem, factors influencing cane growth, Formation and storage of sugar in cane.

UNIT:02 – Agronomy: **[15]**

Irrigation: Water requirement, scheduling, method of irrigation – surface, overhead or sprinkler, drip irrigation, water quality, water logging, drainage – side, main & infield drains.

Manuring: Cane nutrition, functions of macro & micro (trace) nutrients, fertilizers – N, P, K, S, Ca & Mg carriers, Mixed or compound fertilizers, biofertlizers, foliar applications, fertigation, organic & green manuring, time & method of application, visual symptoms of nutrient deficiencies and disorders.

Ripening: Methods of judging ripeness or maturity, factors affecting ripening, accelerating ripening, chemical ripeness.

Harvesting: Manual & mechanical harvesting of cane, transportation of cane, post harvest deterioration of sugarcane – causes, effect & losses, effect of extraneous

Ratooning: Definition, yield & quality, number of ratoons, advantages and disadvantages, area and productivity, causes for low ratooning, tillering, verities for good ratoons, removal of compaction, gap filling, fertilizer application, water requirement.

Subject: Sugar Cane Agriculture: II (DSC ST8)
(Sugar cane Pathology)

UNIT:01 Breeding, physiology &pathology of sugar cane: [15]

Breeding technique in sugarcane, Introduction, varieties, scope of varietal planting, cytology, Raising of seed cane crop – Ideal seed cane, seed cane treatment, measures to obtain higher germination, transplanting technique and its advantages, Breeding Methods Introduction and germ plasma collection, Clonal Selection, Hybridization. Mutation breeding Objectives of sugarcane breeding, Breeding for yield, lodging resistance, resistance to frost, resistance to drought, resistance to water logging, resistance to diseases, resistance to insect pests and quality, Sugarcane breeding institutes in India.

UNIT:02Physiology of sugar cane under normal condition: [15]

Physiology of sugar cane under normal saline condition Rapid screening parameters for salt stress, Agro-technology to improve germination under saline condition, Work on the physiology on various sugar cane clones.

Sugar cane Pathology

Pests: Leaf eating & sucking insects, stalk attacking insects, root attacking insects, soil insects & Non insect species.

Diseases: Major diseases (red rot, smut, pineapple, mosaic, wilt etc.), period of occurrence, control measures (chemical & biological), losses due to pests & diseases, plant protection measures.

Reference Books:

1) Hartmann and Kester's – Plant propagation – Principles and practices – Hudscan T. Hartmann, Dale E. Kester, Fred T. Davies, Jr. Robert L. Geneve.
2) Textbook of Plant Physiology – C. P. Malik.
3) Diseases of Crop Plants in India – G. Rangaswami and A. Mahadevan

Subject : English: I (Compulsory) (AECC – A)

(English for Communication)

UNIT 1: Communication Skills **[15]**

1: How to Express Your Views and Opinions.
2 : Talking About Personal Experiences.
3 : Preparing a C.V. and Writing a Letter of Application

UNIT 2 : Reading Comprehension Skill **[15]**

4 : Forgetting -Robert Lynd
5 : Wife's Holiday -R.K. Narayan
6 : Man in the Future -Bill Williams
7 : Prafulla Chandra Ray

Semester –II
Subject: Applied Chemistry: III (DCS ST9)
(Organic Chemistry)

UNIT :01 - Sugar and Polysaccharides: [15]

- Introduction to Di and Polysaccharides
- Stereochemistry and cyclic forms and Sugar derivatives
- Glycoside bonds & cyclic forms
- Polysaccharides – amylase amyl pectin & cellulose
- Glycosaminoglycans and proteoglycans
- Oligosaccharides of glycoproteins and glycolipids and Lectins

Classification of carbohydrates and Fermentation

- A) Monosaccharides – classification of Monosaccharides
  - Ring straight chain isomerism
  - Use of monosaccharide in living organisms
- B) Disaccharides – Introduction – nutrition – classification - Metabolism Catabolism – carbohydrates – chemistry
- C) Fermentation – Introduction, Definition, Examples, chemistry, ethanol, fermentation, Lactic acid fermentation, Heterolactic fermentation, Methane gasproduction in fermentation

UNIT :02 - Organic acids & Polyphones [15]

- Organic acids & Polyphones in cane juice & their characters.
- Organic acids & their effects on the processing of sugar house products.
- Polyphones and their effects on the processing of sugar house products.

Non sugars in sugar cane juice

- Acids in cane juice-aconite acid, mallic acid, oxalic acid, citric acid, Amino acids & proteins in cane juice.
- Organic non sugar of high molecular weight in cane juice- cellulose, hemicelluloses, lignin, pectin, starch.
- Colored non sugar originally present in cane juice : chlorophy11, xanthophy11, carotene,

anthocyanin. Colored non sugar from sugar decomposition product –

a) caramel b) sugar decomposition product c) inversion of sucrose.

Subject: Applied Chemistry: IV (ST10)
(Physical Chemistry)

UNIT :01 - Solution & Strength of Solution: [12]

- Definitions of the terms: Soltue, solvent, solution & dilute solution.
- Concentration units: Normality, Molarity,molality, mole fraction, weight reaction, percentage composition by weight ant volume.
- Concentrations of bulk solutions used in laboratory and preparation of standard solutions from them (HC1, H2SO4, HNO3 & ammonia),Numerical problems.

Chemical Kinetics:

- Introduction : Rate of reaction, definition and units of rate constants, factors affection the rate of reaction, order andmolecularity of reaction.
- First order reaction: Rate expression (Derivation not expected), characteristics of first

order reaction.

- Pscudounimolecular reactions such as

a) Hydrolysis of methy1 acetate in presence of acid.
b) Decomposition of hydrogen peroxide (KMnO4 method)

- Second order reaction: Derivation of rat constants for equal & unequal concentrations ofthe reactants. Characteristics of second order reaction.

Ex- a) Specification of ethy1 acetate.
b) Reaction between K2S2o8 & KI

- Chemical kinetics with respective sucrose solution, effect of temp, pH retention time, sucrose inversion, destruction of reducing sugar.
- Numerical problems.
-

UNIT:02 - Distribution Law: [12]

- Nernst distribution law: Its limitations, and modification with reference to association and dissociation of solute in one of the solvents.
- Application of Distribution law ini) Process of extraction (derivation expected)

ii) Determination of solubilityiii) Distribution of indicators
iv) Determination of molecular weight.

Colloidal State:

- Definition of colloids
- Types of colloidal systems.
- Solids in liquids (sols):i) Preparation of sols: Dispersion and Aggregation methods

ii) Purification of Sols: Dialysis, Electrodialysis and Ultra-filtration.
iii) Properties of sols: Colour, optical, kinetic and electrical properties.
iv) Stability of sols, protective action, Hardy-Schulze law, gold number

- Liquids in liquids (emulsions):Types of emulsions, preparation, Emulsifier.
- Liquids in solids (gels):Classification, preparation and properties, inhibition.
- General applications of colloids.

UNIT :03 - Analytical Chemistry and Chromatography: [6]

- Basic concept, errors, types of errors, accuracy, precision, statistical representation of analytical data.
- Chromatography – Introduction, Classification of chromatographic methods, introduction of the terms used in chromatography.
- Thin Layer chromatography: introduction of basic concept of the technique, methodology, applications.
- Gas chromatography: General introduction to the terminology used, stationary phases, supports used in making GLC columns.

Reference Books:

1)Organic Chemistry: Hendrickson, cram, Hammond
2)Organic Chemistry: Morrison & Boyd
3)Organic Chemistry: Volume I & II I.L.Finar
4)Organic Chemistry: Pine
5)Advanced Organic Chemistry: Sachin kumar Ghosh
6)Advanced Organic Chemistry: B.S.Bahl&ArunBahi
7)A guide book to Mechanism inorganic chemistry: Peter Sykes
8)Stereochemistry of organic compounds: Kalsi
9)Stereochemistry of Carbon compounds: Eliel
10) Text book of organic chemistry: P.L.Soni

B. Sc. - 1: SUGAR TECHNOLOGY

APPLIED CHEMISTRY - PRACTICAL

1) Determination of the total alkalinity of caustic soda (NaOH).
2) Determination of the total alkalinity of washing soda (Na2CO3)
3) To determine the % of CaO by the EDTA method.
4) Determination of the percentage of hydrogen peroxide by titration method
5) To Determine the purity of sodium hydro-sulphide (hydrous)
6) To determine purity of phosphoric acid by sodium hydrosulphide, hydroxide method.
7) Determination the purity of phosphoric acid by phosphoric molybdenum method.
8) To study some simple test of carbohydrates -, 1) Molish's test 2) Fehiling test
9) Separation and detection of two cations in the given mixture of inorganic salts by paper chromatography. (cobalt sulphate+ Nickel chloride)
10) Separation and detection of two cations in the given mixture of inorganic salts by paper Chromatography (Copper sulphate + Nickel chloride)
11) Determine the strength of the given sodium hydroxide (NaOH).
12) Determine the strength and molarity of the given solution of hydrochloric acid.
13) To investigate the hydrolysis of methyl acetate in presence of 0.5 N HCl.
14) To investigate the relation between potassium persulphate and potassium iodide in Solution with equal initial concentration of the reactants.
15) Determination of the content of sanitation chemical decarbonate.
16) Determination of heat of ionization of weak acid by using polythene bottle.

Subject: Applied Physics: III (DSC ST11)
(Basic Instrumentation)

UNIT:01- Introduction to Instrumentation: [15]

What is instrumentation, Introduction of Industrial Instrumentation, Characteristics of instruments, Static characteristics and Dynamic Characteristic ,Fundamentals & Derived Units,What is error? Type of error.

Transducers:

Transducer & servomechanism, Introduction of transducer, Difference between sensor & transducer, Classification of transducer, a) Active b) passive, Study of transducer used for

1) Level 2) Temp-thermometer/RTD 3) Flow 4) Pressure 5) Vacuum

UNIT:02 - Liquid and Temperature Measurement: [15]

Liquid level measurement: Direct Method: Liquid level indicators, Direct Method: Hook type, sight glass, float type.

Indirect Method: Capacitance level indicator, Radiation level indicator,

Temperaturemeasurement :Electrical resistance thermometer, Bimetallic thermometer, Thermocouples –

Types of thermocouples, Optical pyrometer – Radiation pyrometer.

Pressure and flow Measurement:

Pressure measurement, Type of pressure,Units, Pressure measuring device

a) Bourdon Tube b) manometer c) U-type, well type & barometer vacuum measurement, Flow meter, Total flow, volumetric flow, mass flow, Flow transducers such as :Orifice plates, pitot tube, venturimeter, variable area flow meter, rotameter, magnetic flow meter, mass flow meter.

Subject: Applied Physics: IV (DSC ST12)
(Sugar Instrumentation)

UNIT:01- Signal Conditioner: [15]

What is signal conditioner, Need of signal conditioner, Operational Amplifier, Current to voltage (I to V), Analog to Digital Converter (A to D), Digital to Analog Converter(D to A)Display & records, Digital Vs Analog, Instruments / Displays Seven Segments Displays, Recorders - a) Need of Recorder b)Analog Recorders c) Graphic Recorders d) Strip chart Recorders e) X-Y Recorders

Spectrophotometer:

General principles of absorption spectroscopy, Colorimetry–construction & working, Beer & lamberts law, Standard curve & application

UNIT:02- Flame Photometer: [15]

Basic principle, Elementary theory, Construction Instrumentation of flame photometer,Parameter a) Flame b) monochromators c) detectors, Application of Spectrophotometer

Polarimetry:

Introduction, Plane polarized light, Instrumentation system of polarimetry, Applicationof polarimetry in sugar Technology, Refractometer, Introduction Snell's Law – Specific refraction

Molar refraction – Abbes Refractometer

pH & Conductivity measurements: pH meter, Instrumentation of pH meter, Conductivity meter Instrumentation of conductivity meter, Wheatstone bridge circuit, conductivity cell application.

Reference Book –

1) A.K. Shawny
2) Process control: A.P.Kulkarni
3) Instrumental methods of Chemical analysis: H.Kaur.
4)Instrumental methods of analysis by Strobel.
5) Instrumental methods of chemical analysis:Bhal and Tuli
6) R.N.Shreve: The chemical process industries (MGH)
7)W.I.Badger & J.T. Bandchero: Introduction to Chemical Engineering (MGH)
8) Chemical process principles: O.A.Hougen, R.M.Watson & R.A.Ragetz (Vol. I,II(JW)
9)Industrial Instrumentation & control: S.K.Singh Tata McGraw- Hill Publishing Company Limited, New Delhi
10) Instrumentation: F.W.Kirk & N.R.Rimbol
11)Theory of Errors: Yardley Beers.

B. Sc. - 1: SUGAR TECHNOLOGY

APPLIED PHYSICS - PRACTICAL

Applied Physics Practical

1. Use of VernierCalliper , Micrometer Screw gauge and Travelling Microscope.
2. Moment of Inertia of Disc using Annular ring
3. Y by Vibrating of a bar
4. Bar pendulum
5. Kater's pendulum
6. Poission's Ratio of Rubber Tube
7. Motion of Spring
8. Modulus of rigidity by torsional oscillation
9. Use of Multimeter
10. Resolving power of prism
11. Surface Tension of mercury
12. Surface Tension of soap solution
13. Refractive index of glass by Brewster's law
14. Viscosity of liquid (Searle's Viscometer)
15. Resolving Power of a plane diffraction grating
16. Double Refracting Prism
17. Measurement of Speed
18. Mesurement of Flow
19. Measurement of Pressure
20. Measurement of Level
21. Measurement of Brix and Pol
22. Measurement of Density
23. Measurement of Temperature.

Subject: Applied Mathematics: III (DSC ST13)
(Descriptive statistics)

UNIT:01 - Introduction: [15]

Meaning and scope of statistics, Population and Sample, concept of sample with illustrations, methods of sampling.

Data: Raw data, Attributes and variables, discrete and continuous variables, frequency distribution.

Graphical Representation: Histogram, Ogive Curves and their uses.

Measures of central tendency and dispersion: Concept of central tendency, Criteria for good measures of central tendency. Arithmetic mean: Definition for ungrouped and grouped data, combined mean, weighted mean.

Median: Definition, formula for computation for ungrouped and grouped data, graphical method. Mode: Definition, formula for computing for ungrouped and grouped data.

Measures of Dispersion : Concept of dispersion, measures of dispersion, absolute and relative measures of dispersion, Range and its coefficient, Quartile Deviation and its coefficient,Standard deviation and its coefficient, Variance, coefficient of variation.

UNIT:02 - Moments and Measures of Skewness and Kurtosis: [15]

Raw and central moments (only first four moments), Relation between central and raw moments,

Skewness: Skewness of a frequency distribution, positive and negative skewness, Measures of skewness based on moments.

Kurtosis: Leptokurtic, Platykurtic and Mesokurtic distributions.Measures of kurtosis based on moments.

Correlation and regression: (for ungrouped data) Bivariate data, Concept of correlation, positive correlation, negative correlation, scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank Correlation coefficient.

Regression: Concept, lines of regression, least square method, regression coefficients, relation between correlation and regression coefficients.

Subject: Applied Mathematics: IV (DSC ST14)
(Probability Theory)

UNIT:01 - Probability: [15]

Concept of random experiment, sample space, finite & countable infinite sample space, discrete sample space, events, types of events, power set, classical (apriori) definition of probability of an event, equiprobable sample space, axiomatic definition of probability.

Conditional probability & independence of events: Independence of two events, statement of the result that if A and B are independence events then i) A and B' ii) A' and B iii) A' and B' are also independent, examples. Definition of conditional probability, partition of sample space.

Baye's theorem (only statement)

UNIT:02 - Univariate probability distributions [15]

Definitions: discrete random variable, probability mass function (pmf), cumulative distribution function(cdf), properties of c.d.f., median, mode & examples. Definition of expectation of random variable, expectation of function of random variable. i) E(c) = c, where c is constant. ii) E(aX +b) = a E(X) +b, where a and b are the constants. Definition of mean and variance of univariate distributions. Some standard discrete probability distributions.

Discrete uniform distribution: pmf, mean & variance. Binomial distribution: pmf, mean & variance, additive property, recurrence relation for probabilities. Hyper geometric distribution:

pmf, mean & variance Poisson distribution: pmf, mean & variance, additive property, recurrence relation for probabilities.

Reference Books:

1) Bhat B. R., Srivenkatramana T. and Madhava Rao K. S. (1996): Statistics: A Beginner'sText, Vol. 1, New Age International (P) Ltd.

2) Croxton F. E., Cowden D.J. and Kelin S. (1973): Applied General Statistics, Prentice Hall of India.

1) Goon A.M., Gupta M.K., and Dasgupta B.: Fundamentals of Statistics Vol. I and II, World Press, Calcutta.

4) Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.

5) Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics Ed.4.

6) Hoel P. G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.

B. Sc. - 1: SUGAR TECHNOLOGY
APPLIED MATHEMATICS - PRACTICAL

1) Genaral Equation of Theory – General equation of plane, equation of plane passing through a point, plane passing through three-point, distance of point from a plane.
2) Trignometric Ratios – Trignometric ratios of some standard angles, identities and derivations
3) Determinant and Matrices – Evaluation of determinants, crammers' rules, types of matrices, inverse of matrix.
2) Functions – Types of functions, algebraic function, exponential function and trigonometric functions.

3) Derivatives of a functions – Derivatives of some standard function of first principle, derivative of some composite function, maxima and minima of function.
6) Integration - Method of evaluation of integrals, definite and indefinite integrats.
7) Differential equation – Variable separable form, Bernoulli form of differential equation.
8) Application of differential equations – Low of growth and decay, newtons low of cooling.
9) Measures of central tendancy- I (Ungrouped data)
10) Measures of central tendancy- II (Grouped data)
11) Measures of Dispersion.
12) Moments, Skewness& Kurtosis.
13) Computation of pearson's correction & Spearman's correction coefficient.
14) Lines of regression.
15) Computation of probability & conditional probability.
16) Problems on Baye's Theorem.
17) Problems on Binomial &Hyper geometric distribution.

Subject: Sugar Cane Agriculture: III (DSC ST15)
(Sugar cane cultivation & agronomy)

UNIT:01- **[15]**

Farm Implements and Machinery In Sugarcane Cultivation, Strategies for Transfer of Technology in Sugarcane Agriculture, The different operations carried out during sugarcane planting are

- Making of furrow or trench
- Sett cutting
- Placement of setts in furrows
- Fertilizer application in bands Scientific Sugarcane Cultivation 114
- on either sides of setts
- Application of fungicidal, anti termites and anti insecticide solution
- Covering and pressing of setts..
- Harvesting technology
- Intercultural operations-Mulching, Hoeing and earthing-up
- Tying of cane
- Harvesting and yield-Assessing the maturity of the cane crop
- Harvesting system and harvesting unit

UNIT:02 - Agricultural economics: **[15]**

- Farm management, scope, importance and characteristics, farm
- planning.
- Optimum resource use and budgeting.

- Economics of different types of farming systems.
- Marketing management – strategies for development, market intelligence.
- Price fluctuations and their cost; role of co-operatives in
- agricultural economy
- Types and systems of farming and factors affecting them.
- Agricultural price policy.
- Crop Insurance

Agriculture technology -

- conservation agriculture, principles of conservation agriculture,
- conservation agriculture different from sustainable intensification,
- benefits and challenges of conservation agriculture conservation
- agriculture originate.

Subject: Sugar Cane Agriculture: IV (DSC ST16)
(Sugar cane Pathology)

UNIT:01 -Agronomy: **[15]**

- Cropping patterns in different agro-climatic zones of the country
- Impact of high yielding and short-duration varieties on shifts in
- cropping patterns
- Concepts of various cropping and farming systems.
- Organic and Precision farming
- Package of practices for production of important cereals, pulses,
- oil seeds, fibers, sugar, commercial and fodder crops

Weed science

- Weeds – characteristics
- Dissemination and association with various crops; their
- multiplications
- Cultural, biological, and chemical control of weeds
- Seed production and technology
- Seed production and processing technologies
- Seed certification, seed testing and storage.
- DNA finger printing and seed registration.
- Role of public and private sectors in seed production and
- marketing.
- Intellectual Property Rights (IPR) issues, WTO issues and its
- impact on Agriculture.

UNIT:02: Plant physiology: **[15]**

- Principles of Plant Physiology with reference to plant nutrition,
- absorption, translocation and metabolism of nutrients.
- Soil – water- plant relationship.
- Enzymes and plant pigments;
- Photosynthesis- modern concepts and factors affecting.
- C3, C4 and CAM mechanisms.
- Factors affecting aerobic and anaerobic respiration
- Carbohydrate, Protein and fat metabolism.
- Growth and development; photoperiodism and vernalilzation.
- Plant growth substances and their role in crop production.
- Physiology of seed development and germination; dormancy.
- Stress physiology – drought, salt and water stress.

Reference Books:

1. Agricultural Meteorology- G.S.L.H.V. Prasad Rao, Kerala Agricultural University Publications.
2. Text book of Agricultural Meteorology – M. C. Varshneya and P. Balkrishna Pillai.
3. Introduction to Agro-meteorology- H. S. Mavi
4. Principles of Agronomy by T. Yellamanda Reddy and G. H. Sankara Reddy
5. Soil Management and organic farming By S.C. Panda Agrobios

B. Sc. - 1: SUGAR TECHNOLOGY
SUGAR CANE AGRICULTURE– PRACTICAL

1) Study of internal morphology of sugarcane plant- T. S. of root,
2) Study of internal morphology of sugarcane plant- T. S. of stem
3) Study of internal morphology of sugarcane plant- T. S. of leaf.
4) Determination of soil pH (Any suitable method).
5) Study of soil texture.
6) Determination of humus content (fertility) of the soil sample.
7) Study of deficiency symptoms of macronutrients (N, P, K) in sugarcane plant (Demonstration).
8) Study of sugarcane diseases- red rot, whip smut, leaf scald.
9) Study of sugarcane diseases red strips, mosaic and grassy shoot.
10) Study of sugarcane pests- termites, shoot borer, white flies and armyworms.
11) Study of different varieties of sugarcane with special reference to morphology, sugar percentage, yield. (Any four varieties available in the area)
12) Prepare important rotations for sustainable agriculture.
13) Fertilizer and irrigation management for sustainable agriculture.
14) Nursery techniques - Numerical problems
15) Demonstration of external body parts.
16) Handling of plant protection equipment's
17) Identification of crop seeds, crops associated weeds.
18) Preparation of seed beds of important crops.
19) Study of crop production techniques at different farms.

Subject : English: I (Compulsory) (AECC – B)

(English for Communication)

UNIT 1: Communication Skills **[15]**

1 : Telephonic and E-mail communication.
2 : Making Notes.
3 : Information Transfer.

UNIT 2 :- Reading Comprehension Skill **[15]**

4 : Public Attitude towards Science -Stephen Hawking
5 : Smart Village : Hansdehar -ArchanaBinbusar
6 : Entertainment -Nissim Ezekiel
7 : Parachute -Lenrie Peters
8: Argument with God -Y. S. Chemba