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 ०२३१—२६०९०९४
०२३१—२६०९४८७

Ref:SU/BOS/Science/495 **Date: 02/09/2024**

To,

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

Subject: Regarding Minor Change syllabi of B.Sc. Part-I (Sem.I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

Ref: SU/BOS/Science/876/ Date: 26/12/2023 & 350 Date:/24/06/2024 Letter.

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 Minor Change syllabi, nature of question paper of B.Sc. Part-I (Sem.I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

B.Sc.Part-I (Sem. I & II) as per NEP-2020 (2.0)			
1.	B.Sc Part I Sugar Technology (Entire)	3.	B.Sc Part I Electronics
2.	B.Sc Part I Physics		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025. These chances are available for repeater students, if any.

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

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	5	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	6	I.T.Cell /Computer Centre
3	The Chairman, Respective Board of Studies	7	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	8	Affiliation Section (T.1) (T.2)
9	IQAC Cell		

SHIVAJIUNIVERSITYKOLHAPUR

Syllabus

for

B.Sc.Part-I

Sugar Technology(Entire)

(Under Faculty of Science & Technology)

AS PER NEP – 2020

(To be implemented from Academic Year 2024 – 25)

Shivaji University Kolhapur

NEP-2020 (2.0):Credit framework for UG B.Sc. Programme under Faculty of Science and Technology

B.Sc. I Programme Structure

Level	Semester	Courses			3-OE	4-SEC	5-AEC, VEC, IKS	6-OJT,FP,CEP,CC, RP	Total Credits	Degree/Cum.Cr.MEME
		Course-1	Course-2	Course-2						
4.5	I	DSC-I (Cr.2)	DSC-I (Cr.2)	DSC-I (Cr.2)	OE-I (T/P) (2 Cr.)	--	IKS (2 Cr.)	--	22	UG Certificate 44
		DSC-II (Cr.2)	DSC-II (Cr.2)	DSC-II (Cr.2)						
		DSC P-I (Cr.2)	DSC P-I (Cr.2)	DSC P-I (Cr.2)						
	II	DSC-III (Cr.2)	DSC-III (Cr.2)	DSC-III (Cr.2)	OE-III (T/P) (2 Cr.)	--	VEC – I (2 Cr.) (Democracy, Election and constitution)	--	22	
		DSC-IV (Cr.2)	DSC-IV (Cr.2)	DSC-IV (Cr.2)						
		DSC Pr.-II (Cr.2)	DSC Pr.-II (Cr.2)	DSC Pr.-II (Cr.2)						
	Credits	8 (T) + 4(P) = 12	8 (T) + 4(P) = 12	8 (T) + 4(P) = 12	2 + 2 = 4(T/P)	--	2+2=4 Cr.	--		Exit Option:4 Credits NSQF/Internship/Skill Courses 44

B.Sc. I: Sugar technology Entire: List of courses:

i) B.Sc.Part1(Sem I &II)

Course Code	Name of Course	Course Code	Name of Course
Sem I		**Sem II**	
Course I DSC-I (2 Cr.)	Applied Chemistry–I (Sugar chemistry)	**Course I DSC- III (2 Cr.)**	Applied Chemistry–III (Organic chemistry)
Course I DSC-II (2 Cr.)	Applied Chemistry–II (Biochemistry)	**Course I DSC- IV (2 Cr.)**	Applied Chemistry–IV (Physical chemistry)
Course I DSC P-I (2 Cr.)	Practical in Applied Chemistry -I	**Course I DSC P-II (2 Cr.)**	Practical in Applied Chemistry II
Course II DSC-I (2 Cr.)	Applied Physics-I (Properties of Material &Thermodynamics)	**Course II DSC-III (2 Cr.)**	Applied Physics-III(Basic Instrumentation)
Course II DSC-II (2 Cr.)	Applied Physics-II (Optics Crystallography)	**Course II DSC-IV (2 Cr.)**	Applied Physics-IV (Sugar Instrumentation)
Course II DSC P-I (2Cr.)	Practical in Applied Physics	**Course III DSC P-II (2 Cr.)**	Practical in Applied Physics
Course III DSC-I (2 Cr.)	Sugarcane Agriculture–I (Sugarcane Agronomy)	**Course III DSC-III (2 Cr.)**	Sugarcane Agriculture–I (Sugarcane Agronomy)
Course III DSC-II (2 Cr.)	Sugarcane Agriculture–II (Sugarcane Pathology and Entomology)	**COURSE III DSC-IV (2 Cr.)**	Sugarcane Agriculture–II (Sugarcane botany)
Course III DSC P-I (2 Cr.)	Sugarcane Agriculture–I	**Course III DSC-P 2 (2 Cr.)**	Sugarcane Agriculture–II
OE-1 (T/P) (2 cr.)	Applied Mathematics OR Any Commerce Subject	**OE-2(T/P) (2 Cr.)**	Applied Statistics-III Or any other From Commerce
IKS-1(2 cr.)	Indian Knowledge System(Generic and Specific)	**VEC-1 (2 Cr.)**	Democracy, Election and Constitution
Total	22 Credits	**Total**	22 Credits
	Total Credits: 44 UG Certificate		

Semester –I
Course I DSC-I (2 Cr.)
Subject: Applied Chemistry: I
(Sugar Chemistry)

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.

Course I DSC-II (2 cr.)

Subject: Applied Chemistry: II

(Bio Chemistry)

UNIT: 01– Bio molecules: [15]

- Introduction to living cells, classifications of living cells, structure and function of 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: Glycolsis, Tri Carboxylic 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& Arun Bahi
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

Course I DSC P-I (2 Cr.)

APPLIED CHEMISTRY –I

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) Determine the strength of the given sodium hydroxide (NaOH).
11) Determine the strength and molarity of the given solution of hydrochloric acid.
12) To investigate the hydrolysis of methyl acetate in presence of 0.5 N HCl.

Course II DSC-I (2 Cr.)

Subject: Applied Physics: I

(Properties of Material & Thermodynamics)

UNIT: 01 - Surface Tension: [15]

Explanation of surface tension, angle of contact and wetability, 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, it's application of venturimeter, coefficient of viscosity, flow of liquid through the capillary tube, poiseuillese, Searle's viscometer, determination of viscosity by Ostwald's viscometer.

UNIT: 02 - Kinetic Theory of Gases [15]

Molecule confirm Mean free path 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.

Course II DSC-II (2 cr.)

Applied Physics: II

(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 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.

Applied Physics Practical

Course II DSC P-I (2cr.)

1) Use of Vernier caliper, Micrometer Screw gauge and Travelling Microscope.
2) Moment of inertia of Disc using annular ring
3) Y by vibration of a bar
4) Bar pendulum
5) Kater's pendulum
6) Poisson's ratio of rubber tube
7) Motion of spring
8) Modulus of rigidity by torsional oscillation
9) Use of multimeter

Course III DSC-I (2 cr.)
Sugar Cane Agriculture: I
(Sugarcane Agronomy)

Unit 1-Introduction **[15]**

Definition of Agronomy, scope and importance of Agronomy, Origin of sugarcane, sugarcane Producing country in the world, Distribution of sugarcane area in India, present status of Sugarcane in Maharashtra, Cropping patterns in different agro-climatic zones of the country with sugarcane, sugarcane as a energy plant.

Unit 2- Production technologies of sugarcane **[15]**

Origin, area, production and productivity, soil and climate, improved varieties sawing techniques, planting distance, fertilizers and irrigation management, weed management, Intercultural practices ,Ripening, Harvesting and yield, physiological disorders pest and diseases. Ratooning- definition, yield and disadvantages ,area and productivity, cause of tow ratoons ,tillering, verities for good ratoons ,removal of compaction, gap filling, fertilizers application , water requirement.

Reference Books:

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

Course III DSC II (2 cr.)
Sugar cane Agriculture: II
(Sugarcane Pathology and Entomology)

Unit 1 Diseases

Importance of plant disease, scope and objectives of plant pathology, History of plant Pathology with special reference to Indian work, Terms and concepts in plant pathology Pathogenesis, Principles of Integrated disease management and integrated pest management, Introduction history importance, economic importance of pest and diseases,
Diseases of sugarcane:-Spread of diseases and factors responsible for incidence of diseases Micro-organism responsible for diseases.
1) Whip smut 2) Grassy shoot diseases 3) Rust 4) Pokka Bong
5) Pine apple disease 6) Wilt 7)Eye spot 8) Red rot 9) Brown spot 10) Yellow leaf disease 11) Iron choleras Factors responsible for attack Damage control measures, cultural, measure Mechanical Biological and chemical control of diseases.

Unit 2 Pests of Sugarcane

I) Early shoot Borer Complex (Early shoot borer, Top shoot Borer, Internodes Borer), White Grub(Humani), White fly,pyrilla, wireworm, mealy bug, snails, rats army worm

II) Minor: Armyworm, Mite, Sugarcane Woolly Aphid, Termite

Sugarcane Pest Management:

Factors responsible for attack, damage, control measures, cultural measure, mechanical, biological and chemical control management of pests.

Reference Books:

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

Course III DSC P-II (2 cr.)
Sugar cane Agriculture

1. To Study Agro climatic zone in Maharashtra.
2. To Study Sugarcane and sugar scenario from India.
3. To study different types of fertilizer and pesticides.
4. Determination of soil of pH.
5. To study of deficiency symptoms of macro nutrients(N.P.K) in sugarcane plant.
6. To study different varieties of sugarcane with special reference to morphology, sugarcane yield and sugar percentage.
7. To study techniques of sugarcane seed production.
8. To study of sugarcane dieses -red root, whip etc.
9. To study of sugarcane pests termites, shoot borer etc…
10. Visit to sugarcane farm.

OE-1 (T) (2 cr.)
Subject: Applied Mathematics: I
(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.

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.

Reference Books:

1) Analytical Geometry of two dimensions: R.M. Khan, Allied pub, Kolkata.
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, Nirali Prakashan.
6) Ordinary & Partial Differential Equations :M.D.Raisinghania Analytical, S. Chand & company, New Delhi.
7) Differential Equations: H.V. Kumbhojkar, Nirali Prakashan.
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

(IKS-I) (2 Cr.)

As Per University Syllabus.

Semester –II (4.5)
Course I DSC- III (2 Cr.)
Subject: Applied Chemistry: III
(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 glycoprotein's and glycolipids and Lectins

Classification of carbohydrates and Fermentation

- A) Monosaccharide's – classification of Monosaccharide's
  - 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 gas production 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. Colour non sugar from sugar decomposition product – a) caramel b) sugar decomposition product c) inversion of sucrose.

Course I DSC- IV (2 Cr.)

Subject: Applied Chemistry: IV
(Physical Chemistry)

UNIT :01 - Solution & Strength of Solution: [15]

- Definitions of the terms: Solute, 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 and molecularity of reaction.
- First order reaction: Rate expression (Derivation not expected), characteristics of first order reaction.
- Pseudo molecular 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 Of the 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 - Analytical Chemistry and Chromatography: [15]

- 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& Arun Bahi
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

Course I DSC P-II (2 Cr.)

APPLIED CHEMISTRY - PRACTICAL

1) To investigate the relation between potassium per sulphate and potassium iodide in Solution with equal initial concentration of the reactants.
2) Determination of the content of sanitation chemical decarbonise.
3) Determination of heat of ionization of weak acid by using polythene bottle.
4) Chemical Kinetics- Hydrolysis of Methyl Acetate
5) Separation and detection of two cations in the given mixture of inorganic salts by paper chromatography (Nickel chloride & Copper sulphate)
6) Determination of amount of sodium present in the given solution of common salt using cation exchange resin (by acid base titration)
7)Estimation of Sucrose- to determine the amount of sucrose in the given solution
8) To determine the amount of HCL in the given commercial Sample
9) Determination of percent of Calcium in the given sample of milk power
10) Determination of percent of Calcium in the given sample of Lime Juice
11) Estimation of oxalic acid by titrating with KMNO4

Course II DSC-III (2 Cr.)
Subject: Applied Physics: III
(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, Temperature, Pressure, Mass, Vacuum, Flow, Level 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, Temperature measurement, Electrical resistance thermometer, Bimetallic thermometer, Thermocouples – Types of thermocouples, Optical pyrometer – Radiation pyrometer.

Pressure and flow Measurement:

Pressure measurement, Type of pressure measuring device

a) Bourdon Tube b) monometer 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.

Course II DSC-IV (2 Cr.)
Subject: Applied Physics: IV
(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, Colorimeter–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, Application of polarimetry in sugar Technology, Refract meter, Introduction Snell's Law – Specific refraction

Molar refraction – Abbes Refract meter

pH metre

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.

Applied Physics Practical

Course II DSC P-II (2 Cr.)

1. Study of Basic Instrumentation system.
2. Study the Temperature Measurement system and Flow Measurement system.
3. Study of Level Measurement system and the Pressure Measurement system.
4. To Study the Spectrophotometer system and Colorimeter system.
5. To Study the Flame photometer system and Polari meter system.
6. Study the Spectrophotometer system and the Refractometer system
7. To Study the pH and Conduct meter system.

Course III DSC-III (2 cr.)
Sugar Cane Agriculture: I
(Sugarcane Agronomy)

Unit:1 Agronomy [15]

1. Cropping pattern
2. Concept of various cropping and farming systems.
3. Organic and precision farming
4. Technology for reducing cost of cultivation of sugarcane.
5. Role of co-operatives in agriculture economy.
6. Marketing of sugar- strategies for development market installing gene.
7. Crop insurance
8. Cultivation of sugar beet

Unit –II Soil fertility and nutrient management [15]

1. Determination of soil fertility and its importance
2. Types of fertility- physiology, biological chemical .
3. Physical- soli texture, soli structure, soil density- soli porosity, soli color, water holding capacity.
4. Biological nitrogen fixing bacteria, PSB KMB potash mobilizing bacteria micronutrient soluble micro organism
5. Chemical – chemical fertilizers and there use chemical fertilizers – major , secondary micronutrients .

Course III DSC-III (2 Cr.)

Sugar Cane Agriculture: IV

(Sugarcane botany)

Unit:1 Breeding and physiology of sugarcane [15]

Breeding introduction and objectives of sugarcane breeding – breeding for yield, lodging. Resistance to drought, resistance to water lodging, resistance to disease, resistance to insect pest, Breeding technique in sugarcane, Breeding methods – introduction, germ plasma collection, colonial selection hybridization, Sugarcane breeding institutes in India ,Sugarcane crop physiology – principles of plant physiology with reference to plant nutrition, Absorption, translocation and metabolism of nutrients, Photosynthesis –modern concepts and factors affecting,C3, C4 and CAM mechanisms, Plant growth substance and their role in crop production, Physiology of seed development and germination dormancy ,Stress physiology -drought, salt and water stress.

Unit:2 Sugarcane Seed Production and Technology [15]

Seed production and technology, Seed production and processing technology, seed certification, seed testing and storage of seed, 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

References:

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
4) 4)Plant Pathology – R. S. Mehrota
5) Practical cytology – Applied Genetics and Biostatistics – H. K. Goswami and Rajeev Goswami.
6) Recent Advances in Plant Diseases Vol – 1 to 5 – K. M. Chandaniwala.
7) Introduction to Principles of Plant Pathology – R. S. Singh.
8) An introduction to Plant Anatomy – Author R. Eames and Laurence H. Mac Deniels.
9) Genetics and Plant Breeding – E. B. Babcock.
10) Plant Taxonomy – O. P. Sharma.

Course III DSC P-II (2 cr.)

Sugar cane Agriculture

1.To study soil texture.
2.Determination of humans content fertility of soil sample.
3.Techniques of fertilizer and irrigation management for sustainable agriculture.
4.To study of important any crop rotations for sustainable agriculture.
5.Handling of plant protection equipments.
6.To study of internal morphology of sugarcane plant.-T.S of root
7.To study of internal morphology of sugarcane plant.t.s of stem.
8.To study of internal morphology of sugarcane plant.t.s of leaf.
9.Identification of weeds, crop associated weeds.
10.To study sugarcane based biofules and bio products.

OE-2 (T) (2 Cr.)
Subject: Applied Statistics: III
(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.

Concept of random experiment, sample space, finite & countable infinite sample space, discrete sample space, events, types of events, power set, classical (priory) 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.

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.

3)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.

VEC-I (2 Cr.)
(Democracy, Election and Constitution)

As per University Syllabus

B. Sc. I (Sugar Technology) NEP 2.0
To be implemented from June onwards Semester I & II
Nature of Question Paper
Total Marks 40

Q.1 Choose the correct alternative and rewrite the sentence again. 8 Marks

a)
b)
c)
d)
e)
f)
g)
h)

Q.2 Attempt any TWO of the following (out of Three) 16 Marks

a)
b)
c)

Q.3 Answer any FOUR of the following (out of SIX) 16 Marks

a)
b)
c)
d)
e)
f)

B. Sc. I (Sugar Technology) NEP 2.0
To be implemented from June onwards Semester I & II
Semester I
Nature of Practical Exam

Semester I and II Practical Paper I (40+10 Marks) Semester wise

Number of Days – 01

First Session

Section I (20 Marks)

Q.1 Experiment – 15 Marks

Q. 2 Journal – 05 Marks

Second Session

Section II (20 Marks)

Q.1 Experiment – 15 Marks

Q.2 Journal – 05 Marks

Semester II Practical Paper II (40 +10 Marks)

Number of Days – 01

Number of Days – 01

First Session

Section I (20 Marks)

Q.1 Experiment – 15 Marks

Q. 2 Journal – 05 Marks

Second Session

Section II (20 Marks)

Q.1 Experiment – 15 Marks

Q.2 Journal – 05 Marks

B. Sc. I (Sugar Technology) NEP 2.0

Academic Year 2024-25

Part I Semester – I

Sr. No.	Course Code	Teaching Scheme			Examination Scheme				
		Theory & Practical			University Assessment (UA)			Internal Assessment (IA)	
		Lectures (Per Week)	Practical Hours (Per Week	Credit	Max. Marks	Min. Marks	Exam Hours (HRs)	Max. Marks	Min. Marks
1	**Course I DSC I (2Cr.)** Applied Chemistry I (Sugar Chemistry)	2	-	2	40	14	2.0	10	04
2	**Course I DSC II (2Cr.)** Applied Chemistry II (Bio Chemistry)	2	-	2	40	14	2.0	10	04
3	**Course I DSC P I (2 Cr)** Practical in Chemistry I	-	2	2	40	14	-	10	04
4	**Course II DSC I** (2Cr.) Applied Physics I (Properties of Material & Thermodynamics)	2	-	2	40	14	2.0	10	04
5	**Course II DSC I** (2Cr.) Applied Physics II (Optics Crystallography)	2	-	2	40	14	2.0	10	04
6	**Course II DSC P I (2 Cr)** Practical in Applied Physics	-	2	2	40	14	-	10	04
7	**Course III DSC I** (2Cr.) Sugarcane Agriculture I (Sugarcane Agronomy)	2	-	2	40	14	2.0	10	04
8	**Course III DSC II** (2Cr.) Sugarcane Agriculture II (Sugarcane Pathology & Entomology)	2	-	2	40	14	2.0	10	04
9	**Course III DSC P I** (2 Cr) Practical in Sugarcane Agriculture I	-	2	2	40	14	-	10	04
10	**OE I (T/P)**	2	**Or 2**	2	40	14	2.0	10	04
11	**IKS I**	2	-	2	40	14	2.0	10	04
	Total (A)			**22**	**440**			**110**	

Part I Semester – II

Sr. No.	Course Code	Teaching Scheme			Examination Scheme				
		Theory & Practical			University Assessment (UA)			Internal Assessment (IA)	
		Lectures (Per Week)	Practical Hours (Per Week	Credit	Max. Marks	Min. Marks	Exam Hours (HRs)	Max. Marks	Min. Marks
1	**Course I DSC III (2Cr.)** Applied Chemistry III (Organic Chemistry)	2	-	2	40	14	2.0	10	04
2	**Course I DSC IV (2Cr.)** Applied Chemistry IV (Bio Chemistry)	2	-	2	40	14	2.0	10	04
3	**Course I DSC P II (2 Cr)** Practical in Chemistry II	-	2	2	40	14	-	10	04
4	**Course II DSC III** (2Cr.) Applied Physics III (Basic Instrumentation)	2	-	2	40	14	2.0	10	04
5	**Course II DSC IV** (2Cr.) Applied Physics IV (Sugar Instrumentation)	2	-	2	40	14	2.0	10	04
6	**Course II DSC P II (2 Cr)** Practical in Applied Physics	-	2	2	40	14	-	10	04
7	**Course III DSC III** (2Cr.) Sugarcane Agriculture III (Sugarcane Agronomy)	2	-	2	40	14	2.0	10	04
8	**Course III DSC IV** (2Cr.) Sugarcane Agriculture IV (Sugarcane Botany)	2	-	2	40	14	2.0	10	04
9	**Course III DSC P II** (2 Cr) Practical in Sugarcane Agriculture II	-	2	2	40	14	-	10	04
10	**OE II (T/P)**	2	**Or 2**	2	40	14	2.0	10	04
11	**VEC I -** Democracy, Election & Constitution	2	-	2	40	14	2.0	10	04
	Total (B)			**22**	**440**			**110**	
	Total (A+B)			**44**	**880**			**220**	