SHIVAJI UNIVERSITY, KOLHAPUR - 416004,
MAHARASHTRA
PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्याससमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

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

Ref.No.SU/BOS/Science/270 **Date: 03/05/2025**

To,

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

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

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

B.Sc.Part-II (Sem. III & IV) as per NEP-2020 (2.0)			
1.	Botany	8.	Geology
2.	Physics	9.	Zoology
3.	Statistics	10.	Chemistry
4.	Mathematics	11.	Electronics
5.	Microbiology	12.	Drug Chemistry
6.	Plant Protection	13.	Industrial Microbiology
7.	Astrophysics and Space Science	14.	Sugar Technology (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2025-2026 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 2025 & March/April 2026. 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,

Yours faithfully,

By Registrar
Dr. S. M. Kubal

Encl: As above

for Information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR

Accredited By NAAC with 'A++' Grade

Bachelor of Science Part II

Sugar Technology (NEP 2.0)

(Under Faculty of Science & Technology)

To be implemented from June, 2025 onwards

SHIVAJI UNIVERSITY, KOLHAPUR
Revised Syllabus for the Bachelor of Science in Sugar Technology (As per NEP- 2.0)
Applicable from the Academic Year 2025–26

1. **Title**: B.Sc. II Sugar Technology, Shivaji University, Kolhapur Revised Syllabus as per NEP–2.0
2. **Faculty**: Faculty of Science and Technology.
3. **Year of Implementation**: From June 2025
4. **Objectives of a Bachelor of Science (B.Sc.) in Sugar Technology program include**:
    - Understand the fundamental principles, laws, concepts and formulas of Sugar Technology.
    - Develop problem-solving skills of students.
    - Gain practical experience by hands-on experience with instruments and develop laboratory skills.
    - Learn about advanced sugar technology and its applications for higher studies.
    - Learn to apply conceptual knowledge to practical work.
    - Learn to interpret chemical and physical phenomena through experimental evidence.
    - Learn to analyze and interpret data accurately through scientific reasoning and experimental hypothesis testing.

5. **Program Outcomes:**

PO-1:-**Domain Knowledge**- Acquire advanced knowledge of in sugar industry scientific principles, theories, models and methods in the disciplines of their study.

PO-2:-**Applications**-Able to use scientific knowledge and tools deriving from domain knowledge sugar production.

PO-3:-**Problem Analysis**- Able to identify, formulate and analyze complex problems and find out working solutions using scientific knowledge and tools sugar industry.

PO-4:-**Project Management**-Able to handle individual and/or group tasks and use critical thinking, problem solving and research-related skills sugar industry.

PO-5:-**Individual and Team work**- Able to function effectively as an individual and as a member in diverse teams and in multidisciplinary settings sugar industry.

PO-6:-**Communication Skills**-Able to communicate effectively with the surrounding people and society at large and write reports, documents and make effective

presentations sugar industry.

PO-7:-**Social Awareness**- Able to demonstrate social values through acts of social commitment, display professional ethics and responsibilities showing appropriate consideration for public health, safety and welfare sugar industry.

PO-8:-**Ethics and Human Values**- Able to acquire human values and integrity of character and display moral behavior sugar industry.

PO-9:-**Lifelong Learning**- Able to recognize the need for and have the ability to engage in an independent and life-long learning in the context of drastic technological changes.

6. **Program Specific Outcomes:**

PSO-1. Students will be able to explain fundamental concepts of sugar industry.

PSO-2. Identify chemical formulae and solve numerical problems.

PSO-3. Students can use modern chemic all tools, Models, Charts and Equipment's.

PSO-4. Students will be able to prepare and qualify for competitive examinations

PSO-5. Students will understand good laboratory practices and safety.

PSO-6. Students will develop research-oriented skills.

7. The B.Sc. II Course (Sugar Technology) (Level-5) will be of **Two Semesters (Sem. III and Sem IV)**.
8. Pattern of Examination: The Examinations will be conducted **semester-wise for theory and Practical's.**
9. **Fee structure**: As per Shivaji University guidelines.
10. **Eligibility criteria for Admission to B.Sc. Part II (Level 5.0)**:

i) The students passing or ATKT the B. Sc. Part-I (or Undergraduate Certificate in Science) shall be allowed to enter upon the B. Sc. Part-II (or Undergraduate Diploma in Science).

OR

ii) An Examination of any other Statutory University or an examining Body recognized as equivalent there to.

OR

iii) Completed 3-year diploma course(Mechanical/Electrical/Instrumentation/Chemical/Electronics/Sugar Tech) with subjects allied / related to the subject at B.Sc. Part I

OR

iv) Completed first year of B.E./B. Tech. with subjects allied / related to the subject at B.Sc. Part I

11. **Medium of Instruction**: English

12. **Structure of course:** Given in Frame work Chart.

13. **Scheme of Teaching and Examination:**

a. Each theory course paper constitute of 4-5 units require 30hours of teaching lectures and there shall be two lectures per theory (2 Cr) course per week.
b. B.Sc. II Sugar Technology Course will be of 44 Credits(1100 Marks).
c. Examination of each **theory course** shall be of **50 marks** (40 university examination + 10 internal assessment). University examination of 40 marks (1.5 hours' duration) will be conducted at the end of each Semester. Internal assessment of 10 marks (1 hour duration) will be done before the semester examination during each semester.
d. Examination of practical course shall be of 50marks per semester.
e. Pattern and Nature, marking scheme for theory and Practical Examination for Major Specific SEC and VSC courses are included in syllabus.
f. Question papers will be set in the view of the entire syllabus and preferably covering each unit of the syllabus. Weightage should be provided to each unit as per the hours allotted for teaching.

14. Standard of Passing: The standard of passing shall be as per the following table.

	Semester End Exam	Internal Assessment	Course Exam (Total)
Maximum Marks	40	10	50
Minimum Marks required for passing	14	4	18

i) There shall be a separate head of passing for semester end examination and internal examination.

ii) Minimum18marks out of 50are required for passing of practical examination of each course.

iii) Passing criteria for Co-Curricular Activities (CC) and community Engagement Program (CEP) as per the University guidelines.

15. Nature of Question paper and scheme of marking:

Theory question paper: Maximum marks - 40 Total No.

ofquestion– 3

All questions are compulsory. Question No.1 is MCQ type (8 Marks). Question number 2 is Long answer type question carry 16 marks. Question number 3is short answer type question and it carries 16 marks. (Details are provided at the end of syllabus)

Shivaji University, Kolhapur
Bachelor of Science and Technology
Credit Framework
B.Sc. II Sugar Technology

Level	Sem	Subjects – 1 (Sugar Technology)	Subjects – 2 (Sugar Technology)	IDC/MDC/ OE/GE	VSC /SEC		AEC/VEC/ IKS			OJT,FP,CEP,CC,RP			Total Credits	Degree/Cum. Cr. MEME
		Major	**Minor**	**OE**	**VSC**	**SEC**	**AEC**	**VSE**	**IKS**	**CC**	**EP/ OJT**	**RP/Dissert**		
5.0	III	SM-301 Paper - I Sugar Manufacturing (Clarification) (2 Cr)	SM- 301 Paper II Sugar Manufacturing (Evaporation) (2 Cr)	OE-301 (T) (2 Cr)	VSC-301 Theory Sugar Engineering Paper I (2Cr) (Major Specific)	SEC PR-301 Practical Paper I (2 Cr)	AEC I (2 Cr) (English)	….	….	CC – I (2Cr)	….	…..		UG Diploma 88
		ED- 302 Paper- I Equipment Design I(Clarification) (2 Cr)	ED-302 Paper - II Equipment Design II (Evaporation& Crystallization) (2 Cr)											
		PRST- 303 Practical-I Sugar Technology I (2 Cr)	PRST- 303 Practical-II Sugar Technology II (2 Cr)											
	Credits	**4 (T) + 2 (P) = 6**	**4 (T) + 2 (P) = 6**	**2(T) = 2**	**2 (P) = 2**	**2 (P) = 2**	**2 (T) = 2**	**……**	**…..**	**2**	**…..**	**……**	**22**	
	IV	SM-401 Paper - III Sugar Manufacturing (Crystallization) (2 Cr)	SM-401 Paper - IV Sugar Manufacturing (Centrifugal) (2Cr)	OE- 401 (T) (2 Cr)	…….	SEC- II Theory – 401 Chemical Engineering Paper II (2 Cr)	AEC II (2 Cr) (English)	VEC – II (2 Cr) Environmental Studies)	**…..**	**CEP -I (2Cr)**	**…..**	**…….**	**….**	
		CC- 402 Paper- I Chemical Control (2 Cr)	CC-402 Paper - II Chemical Control (2 Cr)											
		PRST- 403 Practical-III Sugar Technology III (2 Cr)	PRST- 403 Practical-IV Sugar Technology IV (2 Cr)											
	Credits	**4 (T) + 2 (P) = 6**	**4 (T) + 2 (P) = 6**	**2(T) = 2**	**……..**	**2 (P) = 2**	**2 (T) = 2**	**2 (T) = 2**		**2**			**22**	
Total Credits		**12**	**12**	**4**	**2**	**4**	**4**	**2**		**4**			**44**	
		Exit Option: 4 credits NSQF/Internship/Skill courses												

B.Sc. Part II Semester III NEP 2.0

Major V

SM – 301, Paper-I ,Sugar Manufacturing (Clarification) (2 Cr)

Unit I - Introduction **[10]**

- Brief account of sugar industry
- sugar manufacturing process Flow chart
- Composition of cane &juice
- Measuring &weighing of juice
- Equipment detail and operation of Maxwell Boulogne scale, magnetic flow meter
- Fine bagasse separation and their effect on clarification

Unit II - Reagents: **[05]**

- Basic chemical required for clarification
- Specification of basic chemical
- Equipment's detail &operation of Milk of lime preparation unit, SO_2 gas production furnace (continuous & film type).
- Roll of phosphate on clarification &their dose.

Unit III - Clarification Process: **[05]**

- Principle of juice clarification
- Details of sulphitation process
- Details of carbonation process
- Equipment detail and operation of reaction tank

Unit IV - Equipment: **[10]**

- Importance of juice heating.
- Construction and operation of conventional vertical tubular juice heater,
- Principle of settling,
- Factors affecting settling, Speed of settling,
- Equipment construction and operation of Dorr multi-feed, Rapi 444, Preparation of settling aid and their dose, Juice and mud removal, preservation of juice during shut down
- Object of filtration, Preparation of mud, Mud –mixer &Bagacillo cyclone,
- Construction and working of vacuum filter, Mini condenser or vacuum pump,washing of cake, Extraction of light and heavy filtrate

Reference Books:

1) Principle of sugar technology, vol I, P. Honig
2) Principle of sugar technology ,vol II, P. Honig
3) Principle of sugar technology ,vol III, P. Honig
4) Hand book of sugar refinery chung chi chou.

Minor

SM –301, Paper II, Sugar Manufacturing (Evaporation) (2 Cr)

Unit I - Theory of evaporation: [7]

- Introduction of evaporator
- quantity of water evaporated from juice
- Heat transfer in evaporator
- Boiling point of juice
- Norbert Rilleux principle applicable to multiple effect evaporators

Unit II - Construction of Evaporator Body [8]

- Construction of Robert type evaporator
- Entrainment and entrainment separator
- Condenser and type of condenser
- Quantity of water required for condensation
- Vapor velocity and vapor piping
- Other types of evaporator

Unit III -Operation of evaporator [7]

- Off season testing of evaporator
- Starting of evaporator
- Juice level in evaporator
- Condensate and non-condensable gas removal
- Flash recovery of condensate
- Use of condensate
- Stopping of evaporator

Unit IV-Vapor bleeding and steam economy [8]

- Basic requirement of steam
- Steam economy when vapor used for juice heating
- Steam economy when vapor used for juice heating and pan boiling
- Steam saving device
- Construction and working of syrup sulphitor
- Scale formation and removal

Reference Books:

1) Principle of sugar technology vol, I P. Honig
2) Principle of sugar technology vol, II P. Honig
3) Principle of sugar technology vol, III P. Honig
4) Hand book of sugar refinery chung chi chou

Major

ED – 302, Paper I, Equipment Design(Clarification) (2Cr)

Unit I -Juice Heaters: [8]

- Heat transfer coefficient
- Heating surface.
- Sizing of heater
- Tube size and number of tubes
- No of passes and juice inlet/outlet sizes
- Construction of juice heater.

Unit II -Sulphur Burners/ Furnace [7]

- Combustion process of sulphur
- Quantity of air required.
- Capacity of sulphur burner.
- Construction of sulphurburne

Unit III - Juice Sulphitor [7]

- Factors used to design continuous juice sulphitor or reaction tank.
- Lime proportioning device (lime dosing**)**
- SO_2 gas distribution (SO_2 gas dosing)
- Mechanical stirrer for mixing of reagent
- Design of tank with respect of diameter
- Automation for pH control
- Construction of continuous juice sulphitor

Unit IV – A] Juice Clarifier [8]

- Type of clarifier
- Functional theory of operation
- Retention Time
- Flash Tank
- Capacity of Clarifier
- Construction of clarifier

B] Filtration:

- Types of filters

- Theory of the filtration
- Mud mixture
- Capacity of vacuum filter
- Construction of vacuum filter

References:

1) Cane sugar hand book by G.P.Meade & Jamescp.chen
2) Hand book of cane sugar engineering by Hugo .
3) Manufacturing and refining of raw sugar by Baikow.
4) Manufacturing of sugar from sugar cane by G.M.Park.
5) Machinery and equipment's of cane sugar factory by L.A.Tromp.
6) Unit operation of cane sugar production byJon .H. Payne

Minor

ED – 302, Paper-II, Equipment Design II (Evaporation & Crystallization) (2Cr)

Unit IEvaporator [6]

- Heat transfer & Evaporation coefficient
- Heating Surface
- Tube size and no of tubes
- Juice/syrup inlet-out let connection
- Sizing Triple/Quadruple/Quintuple
- Steam requirement.

Unit II Syrup Sulphitor [4]

- Factors used to design syrup sulphitor
- Design of syrup sulphitor with respective to diameter.
- Automation for pH control.
- Specification and construction of syrup sulphitor.

Unit IIIA] Vacuum Pan [10]

- Type of pan
- Important requirement of pan boiling used to design batch pan.
- Different design of batch pan
- The major design aspects used in continuous pan
- Different design of continuous pan
- Pan capacity and heating surface.
- Construction of pan

B] Crystallizers

- Type of crystallizers
- Horizontal v/s Vertical crystallizers.
- Capacity of crystallizer
- Various zones and their retention time in cooling process
- Quantity of water required for cooling

Unit IV A] Centrifugal [10]

- Type of centrifugal
- Gravity factor
- Type of screen
- Massecuite curing cycle
- DC/AC drive, variable frequency drive
- Capacity of basket.

B] Hopper & Grader:

- Drying &cooling of sugar
- Grading of sugar

References:

1) Cane sugar hand book by G.P.Meade & Jamescp.chen
2) Hand book of cane sugar engineering by Hug .
3) Manufacturing and refining of raw sugar by Baikow.
4) Manufacturing of sugar from sugar cane by G.M.Park.
5) Machinery and equipment's of cane sugar factory by L.A.Tromp.
6) Unit operation of cane sugar production by Jon .H. Payne

Major Practical

PRST- 303, Practical I, Sugar Technology - I (2 Cr)

1) To determine the Brix of the given sample by Brix Hydrometer & Hand refractometer
2) To find out the Purity of given sample of Juice.
3) To determine the Purity of Syrup and Molasses.
4) To determine the purity of the Massecuite.
5) To determine the Pol % and Moist % of the Bagasse.
6) To determine the Pol % and Moist % of the Filter cake.
7) To determine the pH of the given sample by
   a. Test Paper
   b. Helige comparator
   c. pH meter
8) To determine the phosphate contents in the given sample by Spectrophotometer.
9) To determine the Reducing sugar by Eyon& lane Method.

Minor Practical

PRST- 303, Practical -II, Sugar Technology - II (2 Cr)

1) Determination of pol percent cane by Rapi pol extractor.
2) Determination of fiber percent cane by Rapi pol extractor
3) To find out expected recovery by lab crusher.
4) Determination of Cao content in mixed juice and clear juice.
5) Determination of P_2O_5 content in mixed juice and clear juice.
6) Analysis of final molasses for purity, reducing sugar, total reducing sugar and ash%.
7) To determine size of slurry size of seed and size of crystal by microscope.
8) Determination of crystal contain of massecuite by nutsh apparatus/lab centrifugal.
9) Determination of viscosity of given sample by digital viscometer.
10) Determination of shock lime ph for clarification process.
11) Determination of Ash by conductivity meter
12) Determination of grade and color by visual method.

Open Elective - Theory

OE – 301 Theory English

VSC-I Theory (Major Specific)
VSC- 301, Theory -I Sugar Engineering (2Cr)

Unit I –A] Cane Handling and Feeding [9]

- Cane unloading -Bridge with trolley- having sling bar system-two motion.
- Feeder table-size, slope, chain, breaking strength, power consumption etc.
- Cane carrier-horizontal & inclined carrier length. Width of carrier, Speed of carrier, capacity of carrier, power consumption of carrier, Type of carrier 1) Split cane carrier 2) Rake carrier 3) Belt carrier

B] Cane Preparations

- Preparation of cane,
- Various device of cane preparation like chopper, leveler, fibrizer & shredder.
- Measurement of preparation index by bulk density method, sieving method, leaching method

Unit II Mills and Mill Components [7]

- Conventional mill
- Mill Headstocks
- Mill rollers & rollers grooving
- Messchaert groove
- Lotus roller,
- Mill hydraulic and loading
- Mill bearing
- Mill pinion
- Trash & Scrapper plate

Unit III Mill drives& Mills setting [5]

- Mill drive- Mill drive power requirement, Prime movers for mills, Mill gearing, Mill couplings and tail bars
- Mill setting-Roller setting, pressure feeder setting; underfeed roller setting, chute opening, trash plate setting, practical optimization of mill setting.

Unit IVA] Steam Generation (Boiler) [9]

- Properties of steam,
- Fuels (Bagasse), characteristics of Bagasse, combustion Bagasse,
- Furnaces (Spreader Stoker & Travelling Grate),

- Boiler, Super heater, Economizer, Air preheated,
- Boiler accessories –feed water tank I.D.& F.DfansChimney,electrostatic participator etc.

B] Boiler Water Treatment:

- Use of condensate
- Feed water specification and treatment (Internal & External),
- DM & RO Plants, analytical control
- Boiler Instrumentation & Control

Reference Books

1) Hand Book of Sugar Engineering By-H.Eugot
2) Hand Book of Cane Sugar By-R.B.L.Mathur
3) Cane Sugar Engineering By-Peter Rein
4) Machinery and Equipment's of Cane Sugar Factory- By Tromp

SEC I Practical

SEC PR- 301, Practical Paper-I (2Cr)

1) To study maintenance of Cane preparation devices in sugar industry (Off Season).
2) To study maintenance of Mill in sugar industry (Off Season).
3) To study Mill setting in sugar industry (Off Season).
4) To study maintenance of mill roller in sugar industry (Off Season).
5) To study maintenance of rotary screen in sugar industry (Off Season).
6) To study maintenance of Boiler in sugar industry (Off Season).
7) To study maintenance of Juice heater in sugar industry (Off Season).
8) To study maintenance of Juice clarifier in sugar industry (Off Season).
9) To study maintenance of evaporator in sugar industry (Off Season).
10) To study maintenance of pan section in sugar industry (Off Season).
11) To study maintenance of Crystallizer section in sugar industry (Off Season).
12) To study maintenance of Centrifugal machine in sugar industry (Off Season).

AEC-I English (2Cr)

This syllabus is as per regular B.Sc. Chemistry Part II

CC-I Sports and Fitness (2Cr)

B.Sc. Part II Semester IV NEP 2.0

Major

SM – 401, Paper-III, Sugar Manufacturing (Crystallization) (2 Cr)

Unit I -Theory of Crystallization **[7]**

- Theory of Crystallization &It's Zones
- Granting & graining methods
- Principals & practices in graining process
- Mechanism of pan boiling

Unit II - Boiling Scheme **[8]**

- Different massecuite boiling scheme
- Principles and practices in pan boiling
- Construction of pan
- Types of pan
- Pan control &instrumentation.

Unit III – Solid Balance **[7]**

- Cobenze's method for purity control
- Calculations of massecuite %cane &molasses %cane by solid balance
- Determination of crystal % massecuite
- Determination of crystal size, volume and surface area
- Determination of steam requirement for massecuite boiling

Unit IV – Massecuite Cooling **[8]**

- Crystallization by cooling
- Type of air and water cooled crystallizers
- Various zones and their retention time in cooling process
- Exhaustion of molasses its calculation &various factor affecting exhaustion

Reference Books:

1) Principle of sugar technology vol -I P. Honig
2) Principle of sugar technology vol -II P. Honig
3) Principle of sugar technology vol -III P. Honig
4) Hand book of sugar refinery chung chi chou

Minor

SM – 401, Paper IV, Sugar Manufacturing (Centrifugal) (2 Cr)

Unit I Centrifugal theories **[8]**

- Centrifugal forces
- Mean equivalent radius
- Gravity factory
- Time cycle
- Capacity of basket
- Moment of inertia
- Powered required

Unit II Centrifugal Construction **[5]**

- Constructions of batch machine types of drive and control
- Constructions of continuous machine types of driveand control

Unit III Centrifugal Operations **[8]**

- Screen washing
- Sugar washing
- Massecuite charging
- Separation of light and heavy molasses.
- Spinning and drying
- Discharging
- Super heated wash water system

Unit IV Drying, Cooling & Grading **[9]**

- Drying and cooling of sugar on hopper, fluidized bed drier, Rotary drier
- Grading of sugar, packing of sugar
- Keeping quality of sugar in storage
- Specification of sugar as per IS standard.
- Constriction of godown& storage of molasses.

Reference Books:

1) Principle of sugar technology vol- I P. Honig
2) Principle of sugar technology vol -II P. Honig
3) Principle of sugar technology vol -III P. Honig
4) Hand book of sugar refinery chung chi chou

Major

CC – 402, Paper I, Chemical Control (Mill House) (2Cr)

Unit I Definition & Formulae [5]

- Technical definition
- Fundamental formula

Unit II- Differential method [8]

- calculation of Brix %Bagasse
- fiber %Bagasse
- added water % fiber

Unit IIIInferential method [8]

- Calculation of mixed juice% cane,
- Bagasse %cane,
- Added water %cane
- Clarification of some concepts like java ratio, E.R.Q.V, B.F.C.W.etc

Unit IV Extraction [9]

- Primary Extraction
- Secondary Extraction
- Mill Extraction
- reduced mill extraction
- Whole mill extraction
- Control parameters and norms for mill efficiency

Reference Books:

1) System of chemical control by N.C.Varma
2) Cane sugar hand book by Meade and chan
3) Cane sugar hand book by R.B.L.Mathur
4) Method of chemical control in cane sugar factory by H.C.Prinsen Geenligs

Minor

CC- 402 Paper II Chemical Control (Boiling House Control) (2 Cr)

Unit I Definition & Formulae [5]

- Technical definition
- Basic formulas for daily manufacturing report.

Unit II Calculation for run report [8]

- Pol, Brix, Non-sugar balance
- Clarification efficiency & clarification factor
- Stock taking & available sugar
- Boiling house losses.
- Equivalent standard granulated. (ESG)

Unit III ESG calculations [8]

- Conversion of raw sugar recovery into white sugar recovery by using ESG formula
- Virtual final molasses purity.
- Operation including &excluding stoppage.

Unit IV Boiling House Recovery [9]

- Recorded boiling house recovery.
- Theoretical boiling house recovery.
- Ideal boiling house recovery
- Boiling house recovery (ESG)
- Reduced boiling house recovery (GUNDU RAO)
- Overall recovery
- Reduced overall recovery
- Control parameters and norms for efficiency.

Reference Books:

1) System of chemical control by N.C.Varma
2) Cane sugar hand book by Meade and chan
3) Cane sugar hand book by R.B.L.Mathur
4) Method of chemical control in cane sugar factory by H.C.Prinsen Geenligs

Major Practical

PRST – 403, Practical III Sugar Technology-III (2 Cr)

1) The determination of sugar solution color at pH 7.0 by the MOPS method GS2/3 – 8
2) The determination of white sugar solution at pH 7.0 ICUMSAGS2/3–9(TEA Buffer Method)
3) Determination of white sugar solution color by I CUMSAGS2/3-10 (Distilled Water) Method
4) Determination of Conductivity Ash in sugar method GS2/3-17Method.
5) Determination of Moisture in sugar method ICUMSAGS2/1/3-15
6) Determination of Reducing Sugar in Sugar method GS2/1/3 -15
7) Determination of Insoluble Matter in white sugar by membrane filtration method GS2/3-19
8) Mesophilic Bacteria in sugar ICUMSA method GS 2/3 -41
9) Yeast and Moulds in sugar ICUMSA method GS 2/3 – 47
10) Raw Sugar Colour Analysis ByGs 1-7 Method.
11) Determination Of Floc In Sugar By (ICUMSA GS 2/3-40 Method).

Minor Practical IV

PRST – 403 Practical IV Sugar Technology IV (2 Cr)

1) To determine total alkalinity of caustic soda.
2) To determine % of Sulphur in sulphur sample.
3) Determine The Purity Of Hcl
4) Determination of Purity & P2O5 Content in phosphoric acid.
5) Determination of Available CaO in Lime.
6) Determination of Purity of Dithiocarbamate By Zink Sulphate Method.
7) Determination of Chemical Oxygen Demand (COD) in waste water & water.
8) Determination of Biological Oxygen Demand (B.O.D) in waste water & water
9) To Analyse boiler feed water for T D S, Alkalinity, Hardness, Sugar Test and pH.
10) Determination of dry matter in Beet pulp.
11) Determination of Marc content in the Beet Sample.
12) Determination of cossette length (Siline Index) of Beet Sample.

Open Elective
OE – 401 (Theory) English

SEC, Theory - 401, Paper II Chemical Engineering (2 Cr)

Unit I Heat transfer: [10]

- Conduction- Mechanism of heat transfer by conduction in solids, Fourier's low of heat transfer, Thermal conductivity, and heat loss in conduction Thermal insulation and optimum thickness for insulation
- Convection- Heat transfer by convection, forced and natural convection, Individual and overall heat transfer coefficient. Fouling factor, overall Resistance Effect of drop wise and film wise condensation, Effect of non condensable gases.
- Radiation –heat transfer by radiation. Kirchhoff's law , Stefan –Boltzmann law

Unit II A] Heat Transfer Equipment: [8]

- Heater–multi-pass shell and tube type heat exchanger-shell, tubes, tube pitchligaments' (clearance), tube passes, Baffles.

B] Fluid transfer Equipment

- **Pumps –** positive displacement and centrifugal pumps, Fans, compressor & blower, Metering of fluids Pipes, Fitting and valves, measurement of liquid and gas flow rates by orifice meter, venture meter, rot meter and pilot tube.

Unit III A] Screening [6]

- Standard screens, capacity of screen & efficiency, Ideal and actual screen, screen analysis, equipment for industrial screening, sieve test of sugar.

B] Evaporation:

- Theory of evaporation, construction and operation of evaporator bodies.

Unit IV A] Filtration: [6]

- Theory, factors affecting filtration and remedies, filter aid and their use, equipment used in sugar factory (Rotary vacuum filter)

B] Centrifugation:

- Theory, different types of centrifugal machines –Batch &continuous, their performance study.

Reference Books:

1) Introduction of Chemical Engineering by Badger and Baneo
2) Introduction of Chemical Engineering by Ghosal and Sanyal
3) Stoichiometry by Bhatt and Vohra

AEC - II English (2 Cr)

This course syllabus is as per regular B. Sc. Chemistry Part II

VEC-II Environmental Studies (2 Cr)

This course syllabus is as per regular B.Sc. Chemistry Part II

CEP- I Community Engagement (2 Cr)

B.Sc. II (Sugar Technology) Syllabus (NEP-2.0)
To be implemented from June 2025 on wards

Semester III & IV

Nature of Question paper
Total Marks 40 Time: 1.5 Hours

Q.1Choose 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. II (Sugar Technology) Syllabus (NEP-2.0)
To be implemented from June 2025 on wards

Semester III & IV

Outline of Internal Assessment

Time Duration: 1 Hour

Level	Semester	Activities Per Semester	Marks
5	III	Unit Test	10
	IV	Oral Examination/Group Discussion	10

B.Sc. II (Sugar Technology) Syllabus (NEP-2.0)

To be implemented from June 2025 On wards

Semester III and IV

Nature of Practical Exam

Semester-III Practical Paper-III (50 Marks)

Number of Days: 01

ExperimentNo-1(20 Marks)

Experiment No. 2(20 Marks)

Oral-05 Marks

Journal-05 Marks

Semester-IV Practical Paper-IV (50 Marks)

Number of Days: 01

Major Experiment-25 Marks

Minor Experiment- 15 Marks

Oral-05 Marks

Journal-05 Marks