SHIVAJI UNIVERSITY, KOLHAPUR.

Faculty of Inter Disciplinary Studies

Accredited By NAAC with 'A' Grade

Syllabus For

Certificate Course in Sugar technology quality control.

(To be implemented from June 2020 onwards.)

(Subject to the modifications that will be made from time to time)

Certificate Course in Sugar Technology Quality Control

1. TITLE : Certificate Course in Sugar Technology Quality Control
Syllabus (Six Months one
semester Pattern)
Under Faculty of Chemistry

2. YEAR OF IMPLEMENTATION : Syllabus will be implemented from 2020-2021

3. DURATION : Six Months One Semester

4. PATTERN OF EXAMINATION – Six Months One Semester Pattern

- Theory Examination – At the end of semester as per Shivaji University Rules
- Practical Examination –

i) At the end of semester there will be internal assessment of practical record,related report submission and project reports.

5. MEDIUM OF INSTRUCTION : English

6. STRUCTURE OF COURSE : Certificate Course in Sugar Technology Quality Control
Six Months One Semester
Four papers Papers per Semester
Two practical exam
One Project
One Industrial Visit

7. SCHEME OF EXAMINATION – A) **THEORY** –

- The theory examination shall be at the end of the semester.
- All the theory papers shall carry 50 (40+10) marks.
- Evaluation of the performance of the students in theory shall be on the basis of examination as mentioned above.

- Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.

- Nature of question paper for Theory examination (excluding Business Communication paper

Nature of Examination :

Q. No. 1 : Multiple Choice Questions (8 Marks)
Q. No. 2 : Long answer type questions (Any two out of Four) (16 Marks)
Q. No. 3 : Short Notes on (Any four of out of Six) (16 Marks)

Internal Marks :

For the internal marks of theory paper conduct 10 marks objective type test with respective paper individually by subject teacher at the end of semester.

B) PRACTICAL

Practical (3 hours) – Evolution of the performance of students in practical shall be based on
(1). Communication skill 10 marks
(2). Experimental Part 40 marks

STANDARD OF PASSING –

As per the guidelines and rules of Certificate Course in Sugar Technology Quality control (Attached separately – Annexure I)

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8. STRUCTURE OF THE COURSE

Certificate Course in Sugar Technology Quality Control

Paper No	Name Of the Paper	Total Credit	Marks		
			External	Internal	Total
	Theory				
1.1	English For Business Communications	04	40	10	50
1.2	General Aspects of Sugar Technology	04	40	10	50
1.3	Sugar Chemistry	04	40	10	50
1.4	Industrial Physics	04	40	10	50
	Practical				
1.5	Skill Based Training	04	40	10	50
1.6	Instrumental Training	04	40	10	50
1.7	Industrial Visit	03	40	10	50
1.8	Project Report	03	40	10	50
	Total Credit	30	320	80	400

Eligibility for Admission : 10+2 or any Diploma.

Elligibility for Faculty :

1. M.A. NET/SET/Ph.D. (English)
2. M.Sc. NET/SET/Ph.D. (Sugar Technology)

Eligibility for Lab Assistant : B.Sc. MSCIT.

Staffing Pattern

Teaching : In the 1st year of B. Voc. – 1 Fulltime and 1 Part-time Lecturer and 1 CHB Lecturer for business communication.

Pattern of a Question aper
B.Voc.
Sugar Technology
Semester – I Paper : I

Paper- 1.1: English For Business Communication

Total Workload: 8 Credit = 4 + 4

Theory: 04 lectures per week

Practical: 04 lectures per week per batch of 20 students

Units Prescribed for Theory: 40 Marks.

Unit 1: Use of English in Business Environment

Topics:

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations

What is a sentence?

Elements of a sentence

Types of sentence: Simple, compound, complex

Unit 2: Writing a Letter of Application and CV/ Resume

Topics:

Structure of a letter of application for various posts

CV/ Resume and its essentials

Unit 3: Presenting Information/Data

Topics: Presenting information/data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flow charts

Unit 4: Interview Technique

Topics: Dos and don'ts of an interview

Preparing for an interview

Presenting documents
Language used in an interview

Reference Books:

1. Sethi,Anjanee&BhavanaAdhikari.*Business Communication*. New Delhi: Tata McGraw Hill
2. Tickoo, Champa& Jaya Sasikumar.*Writing with a Purpose*. New York: OUP, 1979.
Sonie, Subhash C. *Mastering the Art of Effective Business Communication.* New Delhi: Student Aid Publication, 2008.
3. Herekar, Praksh. *Business Communication.* Pune: Mehta Publications, 2007.
4. Herekar, Praksh. *Principals of Business Communication.* Pune: Mehta Publications, 2003.
5. Rai, Urmila& S. M. Rai.*BusinessCommunication.*Himalaya Publishing House, 2007.
6. Pradhan, N. S. *Business Communication.* Mumbai: Himalaya Publishing House, 2005.
7. Pardeshi, P. C. *Managerial Communication.* Pune: NiraliPrakashan, 2008.

Practical: Based on the theory units 10 Marks.

Paper-1.2: General Aspects of Sugar Technology

Work Load: 8 Credits 04+04

Theory: 4 Lectures/Week Theory: 50 Marks

Practical: 4 Lectures/Week/Batch Practical: 50Marks

Objectives:

1. To facilitate students about Sugar Technology
2. To know the introduction of sugar.
3. To be familiar with the properties ofSugar.

Course content:

Theory-

Unit 1 Introduction to Sugar Industry (15)

1.1 Introduction

1.2 Sugar Cane Agriculture

1.3 Availability of Cane

1.4 Utilization of Sugarcane

(a). Granulated Sugar

(b). Brown Sugar

(c). Liquid Sugar

(d). Invert Sugar

Unit 2 Introduction to Sugar (15)

2.1) Introduction – Etymology, History (accent time & middle age) Modern History

2.2) Chemistry of sugar, Constituents of sugar, Natural polymers of sugars, Flammability of sugar.

2.3) Types of sugar, Monosaccharides – Glucose, Fructose, Disaccharides - Sucrose, maltose, Lactose

2.4) Sources of sugar, Sugar beet, sugarcane

2.5) Refining of sugars

Unit 3 : Chemical properties of sugar. (15)

3.1) Chemical properties of sucrose :– sucrose molecule, crystalline sucrose, amorphous sucrose, Aqueous sucrose.

3.2) Solution (solubility, density, viscosity, surface tension, boiling point, freezing point, rotation of polarized light)

Unit 4 : Physical Properties – (15)

4.1) Physical properties of sucrose :– Structure of the sucrose molecule, sucrose derivatives, decomposition of sucrose

4.2) Physical properties of reducing sugar :– Physical properties of dextrose solution (solubility, density, refractive index, optical rotation) Physical properties of invert sugar (solubility, refractive index, optical rotation)

Reference books:

1. Organic Chemistry: Hendrickson, Cram, Hammond.
2. Organic Chemistry: Morrison and 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&ArunBahl.
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: By A. I. Vogel.
12. Advanced Organic Chemistry - Reactions, Mechanism & Structure: JerryMarch.
13. Organic Chemistry: M. R. Jain.
14. Organic Chemistry: J. M. Shaigel.
15. Organic Chemistry: Vol-I, II, and III by S.M. Mukharji, S.P. Singh, R.P. Kapoor (New Age
International Pvt. Ltd. Publishers)
16. Organic Chemistry: By Bhupinder Mehta, Manju Mehta (Prentice-Hall of India Pvt. Ltd.,
New Delhi 110001
17. Text book of organic chemistry: FinarVol I & II
18. Organic Chemistry: Fieser&Fieser
19. Mathematical preparation of Physical Chemistry: F. Daniel, Mc-Graw Hill Book company.

List of Practicals:

1. Measurement of Pol % of sucrose/Molasses on Sucromat.
2. Measurement of Pol % of bagasses on sucromat
3. Measurement of Pol % of Filtercake on sucromat
4. Elemental analysis by flame photometer (Demonstration)
5. Determination of PH of Raw juice by PH meter

6. Determination of PH of Sulphitation juice by PH meter

7. Determination of PH of Syrup by PH meter

8. Measure of colour of juice by colorimeter

9. Measure of colour of Syrup by colorimeter

10. Measure of colour of Sugar by colorimeter

11) Measurement of angle of rotation on Automatic polar meter.

12) To estimate amount of Cu (II) ions by iodometric titration by using Na2S2O3 solution.

13) Quality control-To determine percentage purity of the given sample of soda ash Na2S2O3by titrimetric method.

14) Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method

Paper 1.3: Sugar Chemistry

Work Load- 8 Credits: 4 + 4

Theory:4 Lectures/Week Theory: 50 Marks

Practical:5 Lectures/Week/Batch Practical: 50Marks

Objectives: To enable students –
i) To understand Stereochemistry.
ii) To know the preparation of various Solution.
iii) To study the Carbohydrates and polysaccharides.

Unit – 1 Stereochemistry of organic compounds: [10]
1.1 Stereoisomerism – Introduction.
1.2 Optical isomerism –Introduction.
1.3 Elements of symmetry.
1.4 Chiral centre. (Explanation with lactic acid.)
1.5 Optical isomerism in tartaric acid and 2,3 dihydroxybutanoic acid.

Unit-2 : Carbohydrates [10]
2.1 – Introduction and Classification of Carbohydrates with suitable examples
2.2 Reactions of Monosaccharide such as
(a) Mutarotation
(b) Alkaline degradation
(c) Rearrangements

Unit – 3 : Organic acids and Polyphenols [08]
3.1 Organic acids and their effects on the processing of sugar house products
3.2 Polyphenols: Occurrence, Classification and their effects on processing of sugar house products

Unit – 4: Solution and strength of solution [09]
4.1 Definitions of the terms: Solute, solvent, solution and dilute solution.
4.2 Concentration Units: Normality, Molarity, Molality, Mole fraction, Weight reaction,

Reference books:
1. Biochemistry – Lininger
2. Biochemistry – West and Todd

3. Organic Chemistry: Hendrickson, Cram, Hammond.
4. Organic Chemistry: Morrison and Boyd.
5. Organic Chemistry: Volume I & II. I. L. Finar.
6. Organic Chemistry: Pine
7. Advanced Organic Chemistry:Sachin Kumar Ghosh.
8. Advanced Organic Chemistry: B. S. Bahl&ArunBahl.
9. A Guide book to Mechanism in Organic Chemistry : Peter Sykes.
10. Stereochemistry of Organic Compounds :Kalsi.
11. Stereochemistry of Carbon Compounds :Eliel.
12. Text Book of Organic Chemistry : P. L. Soni.
13. Practical Organic Chemistry : By A. I. Vogel.
14. Advanced Organic Chemistry - Reactions, Mechanism &Structure : Jerry March.
15. Organic Chemistry : M. R. Jain.
16. Organic Chemistry : J. M. Shaigel

Paper 1.5 – Skill based Training - List of Practicals:

N.B.-a. Use of analytical or Digital balance with 1 mg sensitivity is allowed
b. Use S.I. Units wherever necessary.

1. Determination of purity of phosphoric acid by Sodium hydroxide method
2. Determination of purity of caustic soda
3. Determination of CaO content in lime by using pattern and Redder indicator.
4. To determine CaO content in given sample by EDTA Method
5. To determine the phosphate contain in the given sample by Uranium AcetateMethod
6. Determination of percentage of hydrochloric acid in commercial hydrochloric Acid.
7. Analysis of amino acids from the given sample with TLC.
8. Estimation of amino acids from sugar solution or sugarcane juice spectrophotometrically.
9. Determination of polyphenols spectrophotometrically.

Paper-1.4:- Industrial Physics

Work Load- 8 Credits: 04 + 04

Theory:4 Lectures/Week Theory: 50Marks

Practical:Lectures/Week/Batch Practical: 50Marks

Objectives: To enable students –

i) To understand term used in analytical methods.

ii) To know the various operations carried out in Polarimetry, Refractometry.

iii) To study the pH and Conductometry.

Course content:

Theory

Unit – I Introduction to Analytical Methods [10]

1.1) Basic concept,

1.2) errors,

1.3) types of errors,

1.4) accuracy,

1.5) precision,

Unit-II: Polarimetry: (10)

2.1) Introduction, plane polarized light, optical activity,

2.2) Instrumentation of Polarimeter,

2.3) measurement of specific rotation and determination of unknown concentration

and other applications in sugar technology.

Unit-III: Refractometry: (10)

3.1) Introduction,

3.2) Snell's law, specific refraction, molar refraction, Hand Refractometer,

3.3) Abbe's Refractometer,

3.4) experimental techniques and applications.

Unit-IV: pH and Conductivity measurements: (15)

4.1) pH meter, standardization and pH measurements,

4.2) conductivity solutions, specific and equivalent conductivity, equivalent

conductivity at infinite dilution, measurement of conuctivity/resistivity of solution,

Reference books:

1. Instrument engineers handbook – Process measurement by BG Liptak
2. Instrumental methods of analysis by – Wilard ,Merrit& Dean
3. Basic concepts of analytical chemistry – S.M. Khopkar
4. Instrumental methods of chemical analysis – G.W. Ewing
5. A quantitative Inorganic analysis – A. I. Vogel
6. Instrumental Methods of analysis – Willand, Merrit& Olean
7. Vogel's Textbook of quantitative Inorganic analysis revised by J.Bassett et al.
8. Instrumental Methods of Chemical Analysis by H.Kaur.
9. Instrumental methodsof analysis by Strobel.
10. Practical Physical Chemistry by Findley
11. Instrumental methods of chemical analysis by Bhal and Tuli

Paper 1.6 : Instrumental Training - List of Practicals:

1) To find the Recovery of Sugar in Juice by Polari meter.
2) To find Purity of Sugar by Polarimeter.
3) To find purity of massecuite by Polarimeter.
4) To Find the Viscosity of Juice by Viscometer.
5) To Study the handling of spectrophotometer.
6) To study the different types of Transducers and Sensors
7) To Study the Temperature measurement using Thermocouple.

Paper 1.7 : Industrial Visit

Industrial visit contains 50 marks, students will visit nearby Sugar industries.

Distribution of industrial visit marks :

1- Industrial Visit Documentation – 20 Marks
2- Industrial Visit based Viva – 20 Marks
3- Internal Evaluation – 10 Marks

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Total Marks - 50 Marks

Paper 1.8 : Project Work

The project report can be prepared by group of 2 students. The project report will be assessed by internal guide for **10 marks** and **40 Marks** by two external panel examiners appointed by University.

Distribution of Project Marks :

1- Project Documentation - 20 Marks
2- Project based Viva - 20 Marks
3- Internal Evaluation by Guide - 10 Marks

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Total Marks - 50 Marks

Annexure- 1

Standard of Passing :-

To pass the examination in Certificate course in Sugar Technology Quality Control, a candidate must obtain a minimum of 35% of marks in each head of passing and also in Aggregate.

Letter Grades and Grade Points- It is recommended to adopt 10 point grading system with the letter grades as given below:

Award Of Certificate:

a) Certificate course in Sugar Technology Quality Control is a one semester integrated course spread over the period of Six months. The course of Certificate course in Sugar Technology Quality Control will be Six months integrated course commencing from the years as mentioned below:
Certificate course in Sugar Technology Quality Control - SEMESTER I

b) The candidate may take exit after one year of successful completion of the course. After successful completion of Six Months (Semester I) the candidate will get Certificate

Grading Chart of 100 Point

Sr. No	Marks Obtained	Numerical Grade (Grade Points)		CGPA	Letter Grade
1	Absent	00(Zero)		---	--
2	0 – 34	00(Zero)		0.0 – 4.99	F (Fail)
3	35 – 44	05		5.00 – 5.49	C (Satisfactory)
4	45 – 54	06		5.50 – 6.49	B (Average)
5	55 – 64	07		6.50 – 7.49	B+ (Good)
6	65 – 74	08		7.50 – 8.49	A (Very Good)
7	75 – 84	09		8.50- 9.49	A+ (Excellent)
8	85 – 100	10		9.50- 10	O (Outstanding)

Grading Chart of 50 Point

Sr. No	Marks Obtained	Numerical Grade (Grade Points)	CGPA	Letter Grade
1	Absent	00(Zero)	---	--
2	0 TO 17	00(Zero)	0.0 – 4.99	F (Fail)
3	18 TO 22	05	5.00 – 5.49	C (Satisfactory)
4	23 TO 27	06	5.50 – 6.49	B (Average)
5	28 TO 32	07	6.50 – 7.49	B+ (Good)
6	33 TO 37	08	7.50 – 8.49	A (Very Good)
7	38 TO 42	09	8.50- 9.49	A+ (Excellent)
8	43 TO 50	10	9.50- 10	O (Outstanding)

Note:

i. Marks obtained >= 0.5 shall be rounded off to next higher digit.
ii. The SGPA & CGPA shall be rounded off to 2 decimal points.
iii. Marks obtained in 50 marks or 200 marks paper shall be converted to 100 marks.

Calculation of SGPA & CGPA

1. Semester Grade Point Average (SGPA)

$$SGPA = \frac{\sum(Course\ Credits\ x\ Grade\ points\ obtained) of\ a\ semester}{\sum(Course\ Credits) of\ respective\ semester}$$

2. Semester Grade Point Average (SGPA)

$$CGPA = \frac{\sum(Total\ Credits\ of\ semester\ X\ SGPA\ of\ respective\ semester) of\ all\ semester}{\sum(Total\ Course\ Credits) of\ all\ semesters}$$