SYLLABUS

DIPLOMA IN SUGAR TECHNOLOGY

FULL TIME

Course Code: 1074

M- SCHEME
2015 – 2016

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

DIPLOMA IN SUGAR TECHNOLOGY

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DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY
(SEMESTER SYSTEM)

(Implemented from 2015- 2016)

M – SCHEME

R E G U L A T I O N S*

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

1. Description of the Course:

a. Full Time (3 years)

The Course for the full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

b. Sandwich (3½ years)

The Course for the Diploma in Engineering (sandwich) shall extend over a period of three and half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.

During 4th and/or during 7th semester the students undergo industrial training for six months/ one year. Industrial training examination will be conducted after completion of every 6 months of industrial training

c. Part Time (4 years)

The course for the diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

* Each Semester will have 15 weeks duration of study with 35 hrs. /Week for Regular Diploma Programme and 18hrs/ week (21 hrs. / Week I year) for Part-Time Diploma Programmes.

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2015 – 2016 academic year onwards.

2. Condition for Admission:

Condition for admission to the diploma courses shall be required to have passed in

The S.S.L.C Examination of the Board of Secondary Education, TamilNadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in TamilNadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, TamilNadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic) or (Vocational) courses mentioned in the Higher Secondary Schools in TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects.

Sl. No	Courses	H.Sc Academic Subjects Studied	H.Sc Vocational Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretaryship.

- For the diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.

- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit: No Age limit.

5. Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, TamilNadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time(Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Part Time	4 Years	7 Years

7. Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical. The curriculum outline is given in Annexure **- I**

8. Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The Internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Board Examination.

9. Continuous Internal Assessment:

A . For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i. Subject Attendance **5 Marks**

(Award of marks for subject attendance to each subject theory/practical will as per the range given below)

80%	- 83%		1 Mark
84%	- 87%		2 Marks
88%	- 91%		3 Marks
92%	- 95%		4 Marks
96%	- 100%		5 Marks

ii) Test # **10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to:	05 marks
The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to :	05 marks
Total	**10 marks**

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examination-question paper-pattern).	End of 15th week	75	3 Hrs

 # - From the Academic year 2015-2016 onwards.

Question Paper Pattern for the Periodical Test :(Test - I & Test- II)

With no choice:

PART A type questions:	4 Questions X 2 mark	… … 8 marks
PART B type questions:	4 Questions X 3 marks	… … 12 marks
PART C type questions:	3 Questions X 10 marks	… … 30 marks

	Total	50 marks
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iii) Assignment **10 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:

The internal assessment mark for a total of 25 marks which are to be distributed as follows:-

a)	Attendance (Award of marks as same as Theory subjects)	:	**5 Marks**
b)	Procedure/ observation and tabulation/ Other Practical related Work	:	**10 Marks**
c)	Record writing	:	**10 Marks**

	TOTAL	:	**25 Marks**

- *All the Experiments/exercises indicated in the syllabus should be completed and the same to be given for final board examinations.*
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)
- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.

- *All the marks awarded for assignment, Test and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

10. Life and Employability Skill Practical:

The Life and Employability Skill Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering.
Much Stress is given to increase the employability of the students:

Internal assessment Mark ….. **25 Marks**

11. Project Work:

The students of all the Diploma Programmes **(except Diploma in Modern Office Practice)** have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester.**

a) Internal assessment mark for Project Work & Viva Voce:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (award of marks same as theory subjects pattern)
Total	…	**25 marks**

Proper record to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Mark for Project Work & Viva Voce in Board Examination:

Viva Voce	…	**30 marks**
Marks for Report Preparation, Demo	…	**35 marks**
Total		**65 marks**

c) Written Test Mark (from 2 topics for 30 minutes duration): $

i) Environment Management	2 questions X 2 ½ marks	= **5 marks**
iI) Disaster Management	2 questions X 2 ½ marks	= **5 marks**
		10marks

$ **-** Selection of Questions should be from Question Bank, by the External Examiner.

No choice need be given to the candidates.

Project Work & Viva Voce in Board Examination	--	**65 Marks**
Written Test Mark (from 2 topics for 30 minutes duration)	--	**10 Marks**
TOTAL	--	**75 Marks**

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual during the Project Work & Viva Voce Board examination.

12. Scheme of Examinations:

The Scheme of examinations for subjects is given in **Annexure - II.**

13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subject* out of the total prescribed maximum marks including both the internal assessment and the Board Examination marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board's Theory examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2018 onwards (Joined in first year in 2015-2016) will be done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate of marks in all the

semesters put together and passes all the semesters except the I and II semesters in the first appearance itself and passes all the subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all semesters put together and passes all the subjects within the stipulated period of study 3/ 3½ / 4 years (Full Time/Sandwich/Part Time) without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class.**

The above mentioned classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2018 /April 2019 onwards (both joined in First Year in 2015-2016)

15. Duration of a period in the Class Time Table:

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and Lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

16. Seminar:

For seminar the total seminar 15 hours(15 weeks x 1hour) should be distributed equally to total theory subject per semester(i.e 15 hours divided by 3/4 subject). A topic from subject or current scenario is given to students. During the seminar hour students have to present the paper and submit seminar material to the respective staff member, who is handling the subject. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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SALIENT FEATURE OF 'M' SCHEMEs

PROCESS

Sugar Technology is the branch of Technology. Sugar is the essential commodity for human life like rice, wheat, etc. For happy occasion we are giving sweets to relatives and friends and sharing the happiness. It is carbohydrate group, the sucrose present in fruits, potato, sugar beat, and mainly in sugar cane. Sugar cane is the main raw material for sugar manufacturing. The converting of raw material into sugar is lengthy process. Lot of chemicals are involved in this process. In every sugar industry there are 1000 of people working directly and 10000 of people working indirectly.

There are three valuable by product obtained from sugar manufacture.1. Bagasse,2. Filter cake, 3. Molasses. These are very useful in many fields like agriculture, medicine, e The diploma holders play a vital role in the industries as such they are recruited for either supervisory level or as semi-technical personnel on the floor job. So framing of syllabus assumes a special significance for its importance and relevance to meet the technological advancements taking place and to cope up with the modernization-taking place in the field of engineering.

This M -Scheme syllabus is designed and framed in tune with the international standard, under the light of new guidelines and policy prescribed by the Directorate of Technical Education on behalf of the Government of Tamil Nadu.

Salient features of M scheme are : Removal of obsolete portions, Inclusion of professional Ethics, Preparing the students to tackle emergency situations due to various disasters, Enhancement of Computer Skills, Soft Skills and Practical Skills.

A sound knowledge of fundamentals are included. The skill and knowledge expected from a Diploma holder to suit the needs of an industry are incorporated.

CONVENER
Syllabus revision committee – M Scheme
Thiru. C. RAMESH,B.Sc.,(chemistry).
A.V.S.I.(Sugar Technology),M.B.A.,
Lecturer/Sugar Technology,
Government Polytechnic College,
Trichy-22.

ANNEXURE - I

CURRICULUM OUTLINE

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
37431	Sugar organic Chemistry	5	-	-	5
37032	Mechanical Engineering*	5	-	-	5
37033	Electrical and Electronics Engineering*	5	-	-	5
37034	Mechanical Engineering practical*	-	-	4	4
37035	Electrical and Electronics Engineering practical*	-	-	5	5
37036	Workshop Practice – II*	-	-	6	6
30001	Computer Applications Practical #	-	-	4	4
	Seminar	1	-	-	1
TOTAL		16	-	19	35

FOURTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
37441	Chemical Process Industries	5	-	-	5
37042	Momentum Transfer*	5	-	-	5
37443	Sugar Cane Agriculture	5	-	-	5
37044	Engineering Drawing*	-	4	-	4
37445	Sugar Technology Practical-I	-	-	5	5
37046	Momentum Transfer practical*	-	-	6	6
37047	Technical Analysis practical*	-	-	4	4
	Seminar	1	-	-	1
TOTAL		16	4	15	35

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
37051	Heat Transfer*	5	-	-	5
37452	Plantation White Sugar Manufacture	5	-	-	5
37053	Process Instrumentation and Control*	5	-	-	5
37471	Elective I: 1.Process Equipment Capacity	5	-	-	5
37472	2.By Product and Corrosion In sugar Industry				
37055	Chemical Process Measurement and Control practical*	-	-	5	5
37456	Sugar Technology Practical-II	-	-	5	5
30002	Life and Employability Skill Practical #	-	-	4	4
	Seminar	1	-	-	1
Total		21	-	14	35

SIXTH SEMESTER

Subject Code	Subject	Hours Per Week			
		Theory Hours	Tutorial / Drawing	Practical Hours	Total Hours
37561	Plant Engineering And Management $	5	-	-	5
37462	Milling And Chemical Control	5	-	-	5
37481	Elective II: 1. Unit Operation	5	-	-	5
37482	2.Raw Sugar Manufacture				
37464	Sugar Technology Practical-III	-	-	5	5
37465	By Product And Quality Control Practical	-	-	5	5
37466	Computer Application In Sugar Industry Practical	-	-	5	5
37467	Project Work	-	-	4	4
Seminar		1	-	-	1
Total		16		19	35

***Common Subject with Diploma in Chemical Engineering**
 # Common to all branches
$Common Subject with Diploma in Polymer Technology

ANNEXURE - II
SCHEME OF THE EXAMINATION

THIRD SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks	Total Mark		
37431	Sugar Organic Chemistry	25	75	100	40	3
37032	Mechanical Engineering*	25	75	100	40	3
37033	Electrical and Electronics Engineering*	25	75	100	40	3
37034	Mechanical Engineering practical*	25	75	100	50	3
37035	Electrical and Electronics Engineering practical*	25	75	100	50	3
37036	Workshop Practice– II*	25	75	100	50	3
30001	Computer Applications Practical#	25	75	100	50	3
TOTAL		175	525	700		

FOURTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks	Total Mark		
37441	Chemical Process Industries	25	75	100	40	3
37042	Momentum Transfer*	25	75	100	40	3
37443	Sugar Cane Agriculture	25	75	100	40	3
37044	Engineering Drawing*	25	75	100	40	3
37445	Sugar Technology Practical-I	25	75	100	50	3
37046	Momentum Transfer practical*	25	75	100	50	3
37047	Technical Analysis practical*	25	75	100	50	3
TOTAL		175	525	700		

SCHEME OF THE EXAMINATION

FIFTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assessment Marks	Board Exam. Marks	Total Mark		
37051	Heat Transfer*	25	75	100	40	3
37452	Plantation White Sugar Manufacture	25	75	100	40	3
37053	Process Instrumentation & Control*	25	75	100	40	3
37471	Elective-1 Process Equipment Capacity	25	75	100	40	3
37472	By Product and Corrosion In Sugar Industries					
37055	Chemical Process Measurement and Control practical*	25	75	100	50	3
37456	Sugar Technology Practical-II	25	75	100	50	3
30002	Life and Employability Skill Practical#	25	75	100	50	3
		175	**525**	**700**		

SIXTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks	Total Mark		
37561	Plant Engineering and Management$	25	75	100	40	3
37462	Milling and chemical Control	25	75	100	40	3
37481	Elective II: 1. Unit Operations	25	75	100	40	3
37482	2.Raw Sugar Manufacture					
37464	Sugar Technology Practical - III	25	75	100	50	3
37465	By Products and Quality Control Practical	25	75	100	50	3
37466	Computer Application in Sugar Industry Practical	25	75	100	50	3
37467	Project Work	25	75	100	50	3
		175	525	700		

***Common Subject with Diploma in Chemical Engineering**
 # Common to all branches
$Common Subject with Diploma In Polymer Technology

Board Examination - Question paper pattern

Common for all theory subjects unless it is specified

PART A ***- (1 to 8) 5 Questions are to be answered out of 8 questions for 2 marks each.*****(Question No. 8 will be the compulsory question and *can be asked from any one of the units)(From each unit maximum of two 2 marks questions alone can be asked)***

PART B ***- (9 to 16)5 Questions are to be answered out of 8 questions for 3 marks each.*** **(Question No. 16 will be the compulsory question and *can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)***

PART C ***- (17 to 21) Five Questions will be in the Either OR Pattern. Students have to answer these five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question if required)***

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016
On words

SUGAR ORGANIC CHEMISTRY

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma In Sugar Technology (Full Time)

Subject Code : **37431**

Semester : **III**

Subject Title : **SUGAR ORGANIC CHEMISTRY**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SUGAR ORGANIC CHEMISTRY	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME(Hrs)
I	CLASSIFICATION, NOMENCLATURE AND ISOMERISM	17
II	CARBOHYDRATES AND ALCOHOLS	13
III	CHEMISTRY OF CANE JUICE	14
IV	CLARIFICATION	16
V	POLARIMETRY, pH AND COLOUR MEASUREMENT	15
	Total	75

RATIONALE:

The sugar technology student should benefited about Organic compounds, Sugar groups of Carbohydrates and Nutrients composition of cane juice, Amino acids, Organic acids, clarification process, purification of limestone.Definition of Brix, pol, purity, molasses, bagasse, Thus study about sugar manufacturing industry of polarimetry and sacharimeter.

Organic chemistry is that branch of chemistry that deals with the structure, Properties and reactions of compounds that contain carbon, It is a highly creative science. Chemists in general and organic chemists in particular can create new molecules never before proposed which, if carefully designed, may have important properties for the betterment of the human experience.

Beyond our bodies' DNA, peptides, proteins, and enzymes, organic compounds are all around us and in industries such as the rubber, plastics, fuel, pharmaceutical, cosmetics, and detergent, coatings, dyestuffs, and agrichemicals industries. Clearly, organic chemistry is critically important to our high standard of living. There is tremendous excitement and challenge in synthesizing a molecule

never before made synthetically or found in nature. Tailoring the properties of that molecule via chemical synthesis to produce beneficial effects to meet the needs of the present and future human existence is both challenging and rewarding.

OBJECTIVES

On Completion of the units of syllabus contents the students must be able to understand the following:

- On completion of the units of syllabus contents the students must be able
- To learn about the IUPAC nomenclature of the organic compounds.
- To know about the different method of purification of the Organic compounds.
- To know about the different types of Carbohydrates and Alcohols.
- To study about the Glucose.
- They able to know the composition of Cane juice.
- Definition of Organic acid, Amino acids and Wax
- The students are able to know about Clarification and different types of clarification.
- They able to know the definitions of Brix, Pol, Purity.
- Definitions of Massecuites, Molasses, Bagasse.
- Principle of Polari meter and Saccheri meter.

DETAILED SYLLABUS
37431 SUGAR ORGANIC CHEMISTRY

Unit	Name of the Topic	Hours
I	**CLASSIFICATION, NOMENCLATURE AND ISOMERISM** Classification of organic compounds IUPAC nomenclature – Alkane, Alkene, Alkyne, alcohol (Monohydric, dihydric and trihydric) Either, aldehyde, ketone, carboxylic acid (mono and die) acid chloride, ester, cyanide, isocyanide and amine (primary, secondary and tertiary). Purification of organic compounds – principles of crystallization, Sublimation, simple distillation, fractional distillation, steam distillation, column chromatography and thin layer chromatography. Isomerism – structural isomerism – chain isomerism, position Isomerism, functional isomerism, metamerism and tautomerism (Ketoenol tautomerism and nitro-acinitro tautomerism). Stereoisomerism – optical isomerism (Lactic acid and tartaric acid)- Geometrical isomerism (Maleic acid and Fumaric acid).	**17Hrs**
II	**CARBOHYDRATES AND ALCOHOLS** Carbohydrates – Classification – (monosacharides, Disacharides,Oligosacharides and Polysacharides) Structure – isomerism and properties of glucose, fructose and sucrose(Fermentation and Hydrolysis) Alcohols – types of alcohols – (primary alcohol, secondary alcohol and tertiary alcohols) Preparation of methanol – (from water gas and oxidation of CH4) Preparation of ethanol (from ethylene, molasses, starch	**13Hrs**

Unit	Name of the Topic	Hours
III	**CHEMISTRY OF CANE JUICE** Cane juice – composition – different Constituents viz. Protiens, starch, cellulose and hemicelluloses, lignin, poly phenols, liquids and wax etc. Organic acids, amino acids and colouring matters present in cane juice and their role in sugar manufacture. Chemistry of colloids – colloids present in cane juice and their role in sugar manufacture. Chemistry of sucrose – glucose and fructose –inversion and its role in sugar manufacture.	**14Hrs**
IV	**CLARIFICATION** Clarification – different clarification processes and the chemical reactions viz ., defecation , sulphitation etc., Properties and role of the chemicals used in sugar industry viz., limestone, lime, sulphur, super phosphate, hydros etc. Analysis of limestone, lime etc. Ash – constituents – determination of ash.	**16Hrs**
V	**POLARIMETRY, pH AND COLOUR MEASSUREMENT** Definitions of terms used in sugar industry – Brix – Pol – Purity – massecuite – molasses – bagasse. Principles of polarimeter – description of sacherimeter – international sugar scale – normal weight of sugar. P^H– measurement and its role in sugar manufacture. General principles of colour measurement – measurement of color of sugar products- ICUMSA value for white sugar Determination of total solids and moisture of sugar	**15 Hrs**

TEXT BOOKS

1. B.S. Bahl and ArunBahl - Text book of organic Chemistry

2. P.L. Soni and H.M. Chawla - Text book of organic Chemistry

3. Hand book of Sugar Technology by R.B.L.Mathur 2nd Edition, Published by OXFORD & IBH Publishing, Pvt., Ltd. New Delhi

5. Sugar Science Tech., by G.G.Bisch and K.J.Parker 1997 edition, E.L. Sevier publ.

REFERENCE BOOKS:

1. K.S. Tewari S.N. Mehrotra and N.K. Vishnoi - Text book of organic chemistry

2. B.K. Sharma, G.P. Pokhariyal and S.K.Sharma.- Organic Chemistry - Vol-I and II

3. S.P. Shukla and G.L. Trivedi - Modern Organic Chemistry

4. +1 and +2 Chemistry - Tamil Nadu Textbook Corporation

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016
On words

MECHANICAL ENGINEERING

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma In Sugar Technology (Full Time)
Subject Code : **37032**
Semester : III
Subject Title : **MECHANICAL ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MECHANICAL ENGINEERING	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME (Hrs)
I	STRENGTH OF MATERIALS	15
II	MECHANICAL SYSTEMS AND FRICTION	15
III	BASICS OF THERMODYNAMICS AND REFRIGERATION	15
IV	STEAM BOILERS, STEAM TURBINES AND I.C ENGINES	15
V	FUELS, NANOTECHANOLOGY AND ROBOTICS	15
	Total	75

ROTIONALE

Sugar Technology is intimately related with large areas of mechanical engineering. It is, therefore, essential for a Sugar Technology to have basic knowledge of mechanical engineering.

OBJECTIVES

On completion of the units of syllabus contents the students must be able to know about

- Various properties of materials which are commonly used in the Chemical and plastic Industries.
- Using the various metals according to the requirements.
- Transmitting motion from one shaft to another shaft by using various methods like chain, gears and belt and drives.
- Heat energy and generation of steam by using boilers.
- Function of boilers, control devices, safety devices of boilers.
- Explain the basics of systems and laws of thermodynamic and thermodynamic process.
- Refrigeration system.
- Familiarize boiler mounting and accessories.
- Explain the components of I.C Engines.
- Explain various properties of fuels.
- Define different forms of nana materials.
- Explain the components of robot.

37032-MECHANICAL ENGINEERING

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**STRENGTH OF MATERIALS** Mechanical properties of materials – Elasticity, Plasticity, Ductility, Malleability, Wear resistance, Toughness, Brittleness, Hardness, Fatigue and Creep. Simple stresses and strains- types of stress- tensile, Compressive and shear stress – Stress -Strain diagram – Hooke's law – Young's modulus – Lateral strain – Poisson's ratio – Volumetric Strain – Bulk modulus- Temperature stress and strains.Cylindrical shells – Definition – Thin and thick cylindrical shell –. Comparison	**15 Hrs**
II	**MECHANICAL SYSTEMS AND FRICTION** Machine elements – Fasteners – Permanent fasteners – Riveted joints – Welded joints – Temporary fasteners – Screws – Bolts and nuts – Couplings.Power transmission – Belt drives – Advantages and disadvantages Gear drivers – Types of gear – Advantage and limitations Chain drives – Advantages and limitations Friction – Types of friction – Angle of friction – Angle of repose.	**15Hrs**
III	**BASICS OF THERMODYNAMICS AND REFRIGERATION** Pressure – Unit of pressure – Temperature – Absolute temperature – S.T.P and N.T.P – Heat - Specific heat capacity at constant volume(C_v) and at constant pressure (C_p) – Thermodynamic system - Types – Zeroth, first and second laws of thermodynamics. Refrigerators and heat pumps – Vapour compression refrigeration system -Vapour absorption refrigeration system- Comparison – Capacity of refrigeration unit– Co-efficient of performance – Refrigerants– Desirable properties – Common refrigerants – Ammonia – Sulphur -di -oxide – Carbon-di- oxide – Freon – Application of refrigeration.	**15 Hrs**

IV	**STEAM BOILERS, STEAM TURBINES AND I.C ENGINES** Steam boiler – Classification of boilers – Boiler mountings – Safety valve – lever and spring loaded safety valve – Water level Indicator– Pressure gauge– Feed check valve – Boiler accessories – Economizer – Air pre heater – Super heater-Steam turbines – Classification- Differences between impulse and Reaction turbines. Classification of IC engines – Components of IC engines – Cylinder block – Cylinder head– Cylinder liners– Piston – Piston rings – connecting rod – Crank shaft– Cam shaft– Valves – Working principle of IC engines – Two stroke and four stroke engines – Carburetor – Fuel Injection pump – Lubrication of IC engines- Purposes and properties of lubricants .	**15 Hrs**
V	**FUELS, NANOTECHNOLOGY AND ROBOTICS** Fuels – Classification – Solid, liquid and gaseous fuels– Fuel properties – Calorific value of fuels – Octane number –Cetane number– Flash point- Fire point – Cloud point – Pour point – smoke point-Freezing point and Viscosity Index.Nanomaterials – Different forms of nonmaterial's – Synthesis of nonmaterial's- Techniques for synthesis of nonmaterial's – Chemical vapor deposition. Robot– definition – Major components – Robot arm– End effectors – Power source – Controller – Sensor – Actuator – Need for Robots – Sensors – Definition – Types – Applications.	**15 Hrs**

TEXT BOOKS

1. Theory of Mechanics by R.S.Khurmi and J.K.Gupta-EURASIA PUBLISHING HOUSE 1986.
2. Mechanical Technology by R.S.Khurmi-S.Chand and Co., 1988.
3. O.P.Gupta," Elements of fuels, furnaces and Refractory's", Pergaunon Press, Khanna Publishers, Delhi-1-1991.
4. J.D.Girchrist, "Fuels, Furnaces and refractories " Pergunon press, Oxford-1977.
5. Thermal Engineering by N.Rangasamy and E.Sundaramoorthy-Narayana Publications-2011.
6. Engineering Physics-II by Dr.P.Mani-Dhanam Publications-2010.
7. Robotics by P.Jaganathan-Lakshmi Publications-2010.

REFERENCE

1. Heat Power Engineering-II by N.Rangasamy and E.Sundaramoorthy-Narayana Publications-1989.
2. Applied Mechanics and Strength of Materials by R.S.Khurmi-NIRJA Constructions and Development Co.ltd,-1986.
3. Thermal Engineering – Volume- II-S.I Units by M.L.Matur and F.S.Methur and F.S.Mehta-Jain Brothers(New Delhi)-1992

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016
On words

ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology

Subject Code : 37033

Semester : III

Subject Title : **ELECTRICAL AND ELECTRONICS ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
ELECTRICAL AND ELECTRONICS ENGINEERING	5	75	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME (Hrs)
I	BASICS IN ELECTRIC CURRENT	15
II	A.C CIRCUITS	15
III	ELECTROSTATICS AND ELECTROMAGNETISM	15
IV	D.C MACHINES ,A.C MACHINES AND TRANSFORMERS	15
V	BASIC ELECTRONICS	15
Total		75

RATIONALE

All industries including Chemical, Ceramic, Sugar, Petro chemical and Polymer Industries depends on Electric Machineries, Electronics Instrumentation and control for their day to day operations. Therefore, it sounds better if engineering professional of any faculty understands the basics of Electrical and Electronics Engineering. This subject is aimed at developing the required fundamentals.

OBJECTIVES

On Completion of the units of syllabus contents the students must be able to understand

- Fundamental concepts of electric current
- Solve the simple net work analysis problems.
- Basic concepts in A.C circuits
- Express the current in various forms of mathematical representation
- The electrostatic principle of materials
- . Basic concepts in electromagnetism
- The construction, working principle and applications of simple DC Generator, DC Motor &Transformer
- The construction, working principle and applications of various AC Machines used In Chemical Industries
- Basic concept behind the electron devices such as Diodes.
- Basics of Microprocessors and Transducer

37033-ELECTRICAL AND ELECTRONICS ENGINEERING
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**BASICS IN ELECTRIC CURRENT** Electric potential – Resistance- Laws of Resistance – Effects of temperature on Resistance –Resistivity- Resistors- Linear &non-linear Resistors- Ohm's law- Resistance in series & parallel- Conductance- conductivity- Capacitance- capacitor- parallel, multiple and variable plate capacitors- capacitors in series & parallel - Kirchoff's law - Net work analysis by Kirchoff's law and Maxwell's methods- power, work & energy - simple problems in capacitor &Resistor. .	**15 Hrs**
II	**A.C CIRCUITS** Generation of AC current- Terminology in AC currents such as Inductance, Impedance ,Reactance, cycle, Time period, Frequency, Amplitude ,phase &phase angle – AC circuits in series &parallel –power factor-Active &Reactive components of current- Basic concepts in R-L, R-C &R-L-C circuits. Vector representation of AC current- various methods of representation such as rectangular ,Trigono metrical, exponent &polar forms-complex Algebra application in series &parallel circuits-simple problems in calculation of Impedance, current, power &power angle.	**15 Hrs**
III	**ELECTROSTATICS AND ELECTROMAGNETISM** Static electricity-permittivity –laws of electrostatics - Terminology in electrostatics such as electrostatic induction ,electric flux density, field intensity ,electrical potential , dielectric strength and potential gradient- potential at a point-potential & electric intensity due to a charged sphere- simple problems in electrical potential and field intensity . Electromagnetism- magnetic effects of electric current- Faraday's law of electromagnetic induction- Fleming's Right hand rule-Lenz's law –Statically induced and dynamically induced e.m.f-self inductance and mutually inductance- production of induced e.m.f and current- Magnetic Hysteresis .	**15 Hrs**

IV	**D.C MACHINES, A.C MACHINES AND TRANSFORMERS** D.C generator- principle, construction and working of D.C generator – armature windings- various losses in armature such as Iron losses ,copper loss ,magnetic loss and stray losses. D.C motor-Torque- variable speed motors – principle and characteristics of D.C motor- variable speed motors –A.C motor- Induction motor, squirrel gage motor and synchronous motor – principle, construction and operation of above mentioned A.C motors-Alternators- principle, construction and operation of Alternator.- Transformers- principle, construction and operation of Transformer – types of Transformer.	**15 Hrs**
V	**BASIC ELECTRONICS** Methods of producing electronic emission- Thermionic emission- cathodes-Vacuum tubes- Diode and Triode –operation and characteristics of Diode and Triode Gas filled Diodes - Oscillators- Gas filled valves- Gas filled Diodes- construction and characteristics of Gas filled Diodes . Semiconductors-P-type and N- type semiconductors-P-N junction Diode –Zener Diode- Transistor- P-N-P , N-P-N Transistor – Triode Transistor- Thyristor- configuration ,working and characteristics of Transistor. **Microprocessor-(8085):** Architecture- Pin details- Simple Programs (Addition and Subtraction) using Microprocessors - Applications of Microprocessors .	**15 Hrs**

TEXT BOOKS

1. Fundamentals of Electrical Engineering and Electronics , B.L.Theraja, Cheand& co, Ltd., New Delhi-2 .
2. Electronic Devices by V.K.Metha- S. Chand & Co Ltd,. New Delhi-2

REFERENCE BOOKS

1. Electronic Instrumentation by H.S. Kalsi - McGraw Hill.
2. Process Control Instrumentation Technology by Curtis D. Johnson- John Wiley& Sons, Inc.
3. Introduction to Microprocessor by Aditya P. Mathur- Tata McGraw Hill

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016 On Words

MECHANICAL ENGINEERING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology

Subject Code : 37034

Semester: : III

Subject Title : **MECHANICAL ENGINEERING PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester : 15 Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Mechanical Engineering Practical	4	60	25	75	100	3 Hrs

RATIONALE

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

GUIDELINES

- All the experiments given in the list of experiments should completed and given for the end semester practical examination.
- In order to develop best skills in handing Instruments / Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30student during Board Examinations.

LIST OF THE EXPERIMENTS

1. Viscosity Determination using REDWOOD Viscometer
2. Viscosity Determination using SAYBOLT Viscometer

3. Tensile Stress Testing of plastic Materials
4. Refrigeration Test Rig – COP Determination
5. Hardness Test (mild steel or plastic material)
6. Determination of Flash and Fire point of the given oils by open cup method
7. Determination of Flash and Fire point of the given oils by closed cup method
8. Determination of(a) Cloud point and(b) Pour point
9. Compressor test rig.
10. Analysis of coal (a) Proximate analysis and (b) Ultimate analysis

LIST OF THE EQUIPMENTS

1. Red wood viscometer
2. Say bolt viscometer
3. Tensile testing machine
4. Refrigeration kit for C.O.P determination
5. Hardness testing machine
6. Closed cup apparatus of the flash and fire point
7. Open cup apparatus of the flash and fire point
8. Cloud point and pour point
9. Compressor test rig
10. Porcelain crucible

BOARD EXAMINATION EVALUATION

Practical examination

ALLOCATION OF MARKS:	
Aim & Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voice	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016 On words

ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016onwards)

Course Name : Diploma in **Sugar Technology (Full Time)**

Subject Code : 37035

Semester : III

Subject Title : **ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Electrical and Electronics Engineering Laboratory	5	75	25	75	100	3 Hrs

RATIONALE

All industries including Chemical, Petrochemical and Polymer Industries depends on Electric Machineries, Electronics Instrumentation and control for their day to day operations. Therefore, it sounds better if an engineering professional of any faculty have hands on experience in handling electrical machineries and instruments. This subject is aimed at giving hands on experience of handling electrical and electronic devices.

GUIDELINES

- All Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..

- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS

ELECTRICAL ENGINEERING

1. Determination of Unknown Resistance by ohms law.
2. Energy measurement in a single phase circuit using Lamp load.
3. Power measurement in a single phase circuit.
4. Load test on a single phase transformer.
5. Verification of Series and parallel circuit.

ELECTRONICS ENGINEERING

1. Characteristics of Transistor.
2. Transistor Based Amplifier.
3. Zener Diode Voltage Regulator
4. Construction of Bridge Rectifier.
5. Characteristics of Photo Diode.
6. Measurement using CRO
7. Addition and Subtraction using Microprocessor.

LIST OF EQUIPMENTS

- Rheostat of various range
- RPS (0-12v, 0-30v)
- Ammeters (MC and MI) of various ranges
- Voltmeters (MC and MI) of various ranges
- Wattmeter – 300v/5A-2.5A/UPF
- Energy meter – 300v/5A
- CRO and Function Generator
- Microprocessor kit
- Diode, Transistor, Logic Gate ICs, Photodiode
- and Thermistor -10nos each(Consumable)
- Resistors, Capacitors various ranges

- Breadboards and connecting wires
- Multi meter

BOARD EXAMINATION EVALUATION

Practical examination

ALLOCATION OF MARKS:	
Aim & Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voice	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016 On words

WORKSHOP PRACTICE-II

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology (Full Time)

Subject Code : 37036

Semester : III

Subject Title : **WORKSHOP PRACTICE-II**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Workshop Practice - II	6	90	25	75	100	3 Hrs

OBJECTIVES

- Identify the parts if a center lathe
- Identify the work holding devices
- Set the tools for various operations
- Operate the Lathe and Machine a Component using Lathe
- Identify the tools used in Plumbing
- Identify the tools and equipments used in welding

LATHE SHOP

1. Plain Turning
2. Step Turning
3. Tapper Turning
4. Knurling

PLUMBING SHOP

1. Pipe cutting and thread cutting practice
2. “Coupling” joint

3. “Elbow” joint
4. “Tee” Joint

WELDING SHOP

1. Straight Line Beds
2. Butt Joint
3. Lab Joint
4. “T” Joint
5. Corner Joint

LIST OF EQUIPMENTS / INSTRUMENTS, MATERIAL, MANUALS REQUIRED (FOR A BATCH OF 30 STUDENTS)

S.NO	NAME OF EQUIPMENT / INSTRUMENT	NO.
1	Lathe	10
2	Plumbing	10
3	Welding	10

BOARD EXAMINATION EVALUATION

PRACTICAL EXAMINATION

Note:

1. Arrangement should be made to conduct the examination inside the workshop for any one of the section.

ALLOCATION OF MARKS

Particulars	Maximum Marks
Dimensions	30
Turning / plumbing / welding	30
Finishing	10
Viva Voice	05
Internal Assessment	25
Total	**100**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

III –SEMESTER

2015-2016 On words

COMPUTER APPLICATIONS PRACTICAL

COMMON TO ALL ENGINEERING BRANCHES

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU.

M- SCHEME

(to be implemented for the student Admitted from the Year 2015-2016 on wards)

Course Name : For All Branches

Subject Code : 30001

Semester : III

Subject title : COMPUTER APPLICATIONS PRACTICAL

TEACHING & SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Course	Instruction		Examination			
			Max.			Duration
	Hours/ week	Hours/ Semester	Internal Assessment	Board Examination	Total	
COMPUTER APPLICATIONS PRACTICAL	4Hrs	60 Hrs	25	75	100	3Hrs

RATIONALE:

The application of Computer knowledge is essential the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents and presentation of documents with audio visual effects ina computer and produces necessary skills in E- Learning and Chatting tools..

OBJECTIVES:

On completion of the following exercises, the students will be able to

- Use the GUI operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Prepare Power Point presentation with different formats
- Expose E-learning tools and chatting tools
- Analyze the datasheet
- Create and manipulate the database
- Create different types of charts
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratioforpracticalclasses

SYLLABUS
LAB EXERCISES
SECTION – A

GRAPHICAL OPEARTING SYSTEM

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – Recording Audio files.

Exercises

1. a. Installing screen saver and change the monitor resolution by 1280X960
   b. Setting wall papers
   c. Creating, moving, deleting and renaming a folder
   d. Copy, paste and cut a folder/file
   e. Displaying the properties for a file or folder
2. a. Restoring files and folders from Recycle bin
   b. Creating short cuts for folder/file
   c. Finding a file or folder by name
   d. Selecting and moving two or more files/folders using mouse
   e. Sorting folders/files.

WORD PROCESSING

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.

Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

3. Create the following table and perform the operations given below

<table>
<tr><th>DAYS</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>MON</td><td colspan="2">←TEST→</td><td colspan="3">A: JPP
B:RDBMS</td><td>CA</td><td>RDBMS</td><td>TUT</td></tr>
<tr><td>TUE</td><td>CA</td><td>OOP</td><td>CN</td><td>RDBMS</td><td colspan="4">A: RDBMS
B: JPP</td></tr>
<tr><td>WED</td><td>CN</td><td>RDBMS</td><td>OOP</td><td>RDBMS</td><td colspan="2">COMMUNICATION</td><td>CN</td><td>CA</td></tr>
<tr><td>THU</td><td>OOP</td><td colspan="3">A: JPP
B: RDBMS</td><td>CA</td><td>RDBMS</td><td>CN</td><td>OOP</td></tr>
<tr><td>FRI</td><td colspan="2">COMMUNICATION</td><td colspan="2">A: RDBMS
B: JPP</td><td>OOP</td><td>CN</td><td>RDBMS</td><td>CA</td></tr>
<tr><td>SAT</td><td>OOPS</td><td>RDBMS</td><td>CN</td><td>CA</td><td colspan="4">---------</td></tr>
</table>

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

Result is Distinction if Total >= 70 %

First Class if Total > = 60 % and < 70 %

Second Class if Total >= 50 % and < 60 %

Pass if Total >= 35 % and < 50 %

Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product1	Product2	Product3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – B
DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null

10. create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening -Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

Exercises

12. Make a marketing presentation of any consumer product with at least 10 slides.
    Use different customized animation effects on pictures and clip art on any four of the ten slides.
13. Create a Presentation about our institution or any subject with different slide transition with sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail - Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics .

Most Popular Social Networking Sites : History – Features – Services – Usage of Face book , Twitter and Linkdln.

Transferring data through wifi / bluetooth among different devices.

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. Create an e-mail id and perform the following
    - Write an e-mail inviting your friends to your Birthday Party.
    - Make your own signature and add it to the e-mail message.
    - Add a word attachment of the venue route
    - Send the e-mail to at least 5 of your friends.

15. Create a presentation on Google docs. Ask your friend to review it and comment onit. Use “Discussion” option for your discussions on the presentation.

Hardware and Software Requirements

Hardware Requirements:

- Computers – 36Nos
  - Intel Core i3 Processor
  - 500 GB Hard Disk, 2 MB RAM
  - 14” Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

Software Requirement

- Any GUI Operating System
- Open Source Software / MS- Office

1. SemesterEndExamination–75 Marks

Content	Max.Marks
Writing Procedure – One Question from Section A	15
Demonstration	15
Results with Printout	5
Writing Procedure – One Question from Section B	15
Demonstration	15
Results with Printout	5
Viva voce	5
Total	**75MARK**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On Words

CHEMICAL PROCESS INDUSTRIES

CURRICULUM DEVELOPMENT CENTRE

M- SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name	:	**Diploma in Sugar Technology (Full Time)**
Subject Code	:	37441
Semester	:	IV Semester
Subject Title	:	**CHEMICAL PROCESS INDUSTRIES**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CHEMICAL PROCESS INDUSTRIES	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME (hrs.)
I	WATER TREATMENT	16
II	ACID INDUSTRIES	14
III	PAPER AND PULP AND FERMENTATION INDUSTRIES	15
IV	FURNACES AND REFRACTORIES	16
V	FERTILIZERS AND GAS INDUSTRIES	14
	Total	75

RATIONALE

The students can know about water softening methods, presence of free oxygen in water, manufacturing process of acids and the raw materials used for it and its industrial applications. They get the detailed knowledge about the production of paper, starch, glucose, production of fertilizers, industrial gases and their flow chart.

OBJECTIVES

On completion of the units of syllabus contents the students must be able to know about

- In this unit the students get to know about how water requirement in process Industries.
- He also learns about water softening methods and demineralization of water.

- The student gets to know about the presence of free oxygen determined by BOD and COD.
- In this unit the students get to know about the Acids and its Industrial Applications.
- Students come to know about the General properties of catalysis, promoters and poisons.
- Students able to know about pulping process from sugarcane bagasse.
- Chemical recovery from spent cooking liquor in Kraft process.
- He also learns about the structure, manufacture and uses of glucose, starch and ethyl alcohol.
- The student gets to know about the construction and operation of Blast furnace and electric arc furnace and different type and properties of refractory's.
- In this unit the students get to know about the gas and fertilizer Industries.
- The student gets to know about the manufacture process and Industrial Application.

37441- CHEMICAL PROCESS INDUSTRIES
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**WATER TREATMENT** Source of water – Water requirement in Process industries – quality of water – Hardness causing chemical and other contaminants – Water softening – Cold lime and hot lime soda process – Ion exchange – sodium cation and hydrogen cation exchange process – Regeneration – demineralization of water – Boiler feed water treatment – Municipal waste water and industrial waste water Treatment – tertiary treatment – water desalination by reverse osmosis and electro dialysis – Biological and chemical oxygen demand – BOD and COD. Waste water reuse – Application for irrigation and drinking purpose.	**16 Hrs**
II	**ACID INDUSTRIES** Sulphuric acid – Industrial uses – raw materials – Manufacture by contact process Nitric acid – industrial uses – raw materials and manufacturing process, hydrochloric acid – Industrial uses – raw materials and manufacturing process – phosphoric acid – Industrial uses – raw materials and manufacturing process. Sulphur and sulphur di oxide – Industrial uses – raw materials and manufacturing process .Catalysis: General properties of homogeneous and heterogeneous – promoters and poisons	**14 Hrs**
III	**PAPER AND PULP AND FERMENTATION INDUSTRIES** Paper and pulp – raw materials – Kraft and Sulphite process of pulping from sugarcane bagasse – production of paper from pulp – Chemical recovery from spent cooking liquor in Kraft process.Starch and glucose – uses – structure raw materials –manufacturing processes. Ethyl alcohol – grades Industrial uses – raw materials– manufacture.	**15 Hrs**

Unit	Name of the Topic	Hours
IV	**FURNACE AND REFRACTORIES** Furnaces classification – Blast furnace, electric arc furnace – Construction and operation of the above furnaces – Fuel economy in the operation of Fuel fired furnaces – chimneys and their functions. Refractories: Different types and properties. Refractory material used in different types of furnaces – fire clay, Silica, high alumina, dolamite and graphite – General methods involved in the manufacture	**16Hrs**
V	**FERTILIZER AND GAS INDUSTRIES** Raw materials – manufacture - usesFertilizer Industries: Nitrogen Industries – urea, Ammoniumnitrate. Phosphorous Industries – super phosphate and Triple superphosphate Potassium Industries – Potassium sulfate, potassium chloride.Industrial gases: Carbon-di-oxide, Sulphur-di-oxide, producer gas and Natural gas. Hydrogen gas	**14 Hrs**

TEXT BOOKS:

1. Shreve's Chemical Process Industries - George T.Austin - Fifth Edition McGraw Hill Book Co. Singapore - 1984
2. Dryden's Outlines of Chemical Technology for the 21st Century - Gopal Rao &Sittig - 3rd Edition - Affiliated East West Press Pvt. Ltd., New Delhi - 2001
3. Gupta O. P., Elements of fuels, Furnaces and Refractories, 4th Edition, 2002, Khanna Publishers, New Delhi
4. Fuels, Furnaces and Refractories by Gilchrist – Allied publishers.
5. Chemical Engineering kinetics J.M. Smith, Third Edition.

REFERENCE BOOK:

1. Chemical Engineering by P.C. Jain and Monica Jain
2. Chemical technology I and II - Chemical engineering education development Centre I.I.T. Chennai.
3. Industrial Chemicals by Faith - John Wiley and Sons.
4. Encyclopedia of Chemical Technology - 4th Edition Kirk and Oth

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

MOMENTUM TRANSFER

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology

Subject Code : 37042

Semester : IV

Subject Title : **MOMENTUM TRANSFER**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MOMENTM TRANSFER	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME(Hrs.)
I	FLUID STATICS	15
II	FUNDAMENTALS OF FLOW DYNAMICS	17
III	FLOW OF INCOMPRESSIBLE FLUIDS IN PIPES	17
IV	TRANSPORATION OF LIQUIDS	13
V	TRANSPORTATION OF GASES,PIPINGS AND VALVES	13
	Total	75

RATIONALE

Fluids Mechanics is a science subject and helps in solving problems in field of Aeronautical, Electronics, Electrical, Mechanical and Metallurgical Engineering subjects. The subject deals with basic concepts and principles in hydrodynamics, hydrokinetics and hydrostatics and their applications in solving fluid flow problems.

The knowledge of fluid flow is very essential because all chemical plants have fluid flow. The examples are flow of stream and gases in pipes, flow of liquid in pipes and open Channels etc. This subject aims at the basic concepts of fluid flow, measurement Techniques involved for the same and equipments used for the

transportation of fluids. With this background, students will be able to quantitatively find out material and power Requirement for a process.

OBJECTIVES

- After completion of the entire syllabus, mentioned above the students are able to know the information about the following:
- Importance of Fluid Mechanics.
- Basic principles and properties of fluids.
- Manometers.
- Behavior of fluids, Newtonian and non- Newtonian fluids.
- Reynolds number and its use.
- Continuity equation and its application. Bernoulli's equation and its application in fluid flow.
- Boundary layer concept.
- Flow of fluids through circular pipes in steady state.
- Haugen – Poiseullies equation, Friction factor chart.
- Different types of pumps used for transportation of liquids.
- Their method of construction and working principles, their specific fields of Application,
- Performance characteristics of centrifugal and reciprocating pumps Terminologies.
- Blowers and compressors and their types.
- Their method of construction and working principles.
- Method of generating vacuum.
- Different types of valves and their specific applications.

MOMENTUM TRANSFER

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**FLUID STATICS** Definition: Fluid statics and Fluid Dynamics.-Nature of fluid-Classification of Fluids: Ideal Fluid, Compressible, Incompressible Fluids, Newtonian and Non-Newtonian Fluids.-Transport Properties of Fluids: density, pressure, viscosity, consistency and fluidity. Fluid Statics: Pressure concepts –Types of pressure - Pressure head-compressibility factor - Hydrostatic Equilibrium- Barometric equation. Manometers: Simple U-tube manometer – Inverted U–tube Manometer- inclined tube manometer – Differential U–tube manometer-Derivation of equation and uses.- Simple problems in manometers.	**15 Hrs.**
II	**FUNDAMENTALS OF FLUID DYNAMICS** Fluid flow phenomena: steady flow, unsteady flow , potential flow, frictional flow, fully developed flow, laminar flow, turbulent flow and transition flow -Shear stress and velocity gradient-profile of velocity and velocity gradient- Momentum flux -Reynolds number -Reynolds experiment and its significance .Turbulence: wall Turbulence and free Turbulence –intensity and scale of turbulence –Terminology in fluid flow: stream line , stream tube, Average velocity, Mass velocity, skin friction and Form friction. Principle of conservation of mass, energy and momentum-. Basic equations of fluid flow: Continuity equation- Bernoulli's equation for potential flow, fluid friction, effect of solid boundaries and pump work (exclusion of derivation) - limitations of Bernoulli's equation. Energies of fluids: Potential energy, pressure energy and kinetic energy - (Statement only) and its application - Simple problems in Reynolds number and Continuity equation.	17 Hrs.
III	**FLOW OF INCOMPRESSIBLE FLUIDS IN PIPES** Concept of boundary layer- Boundary layer formation in straight tubes.-laminar and turbulent flow in boundary layer-transition length- boundary layer separation- Shear stress distribution in a cylindrical tube- Relation between skin friction and wall shear- Fanning friction factor.- Laminar flow in Newtonian fluid in circular pipes-Relationship between maximum velocity and average velocity. - The Hagen- Poiseuille equation-Turbulent flow in pipes – Effect of roughness- friction factor chart and its uses-effect of heat transfer on friction factor-flow through non-circular conduits- Equivalent diameter-Hydraulic radius- Friction losses from sudden enlargement ,contraction and fittings, Flow of past immersed bodies: Fluidization-	17 Hrs.

	mechanism of Fluidization-minimum porosity-bed height-particulate and aggregative fluidization-dense and disperse fluidization -minimum fluidization velocity-pressure drop in fluidization -simple problems in pressure drop, head losses and Hagen-Poiseuille equation.	
IV	**TRANSPORTATION OF LIQUIDS** Equipments for Liquid transport - Pumps – Classification of pumps- Capacity and Overall efficiency(Definition)- Positive displacement pumps - Reciprocating pumps – single and double acting piston pumps, single and double acting plunger pumps and Diaphragm pumps - Rotary pumps - internal gear and external gear pumps - their construction and working. Centrifugal pumps –Principle, construction and Working – advantages- Losses in centrifugal pump- start up procedure for centrifugal pump- Terminology - Suction head, Discharge head, Developed head, Horse power, Net Positive Suction Head, Priming, Cavitations- Operational Characteristics Curves of Centrifugal pumps- centrifugal pump troubles and remedies.	13 Hrs.
V	**TRANSPORTATION OF GASES ,PIPINGS AND VALVES** Fans- centrifugal and axial fans- Blowers- Positive displacement blower- Two-lobe blower and Centrifugal blower- single suction centrifugal blower- Compressors - reciprocating and axial compressors - vacuum producing equipment – steam-jet ejector its principles and operation. Pipes and tubes-pipe size-steel pipe standards-pipe fittings ,hangers and supports –allowances for expenses. Valves- Gate valve,Globe valve, Ball valve, Needle valve NRV, Diaphragm valve their working and its industrial applications.	**13 Hrs**

TEXT BOOKS

1. Unit Operations of Chemical Engg. By W.L.McCabe and J.C.Smith – Sixth edition – McGraw Hill Book Co. Singapore – 2001.
2. Introduction to chemical Engg. By W.L.Badger and J.T.Banchero – Tata McGraw Hill
   Publishing Co.Ltd., New Delhi – 1997.

REFERENCE BOOKS

1. Principles of Unit Operations by A.S.Foustetal – Wiley International Edition – 1960.
2. Chemical Engineering Vol-1&II by J.M.Coulson and J.F.Richordson – Sixth Edition
   Butterworth –New Delhi – 2000.
3. Perry's Chemical Engineer's Hand Book by Robert H.Perry and D.W.Green - Seventh Edition – McGraw Hill Book Co. Singapore – 1997.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

SUGAR CANE AGRICULTURE

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards]

Course Name	:	Diploma In Sugar Technology(Full Time)
Subject Code	:	37443
Semester	:	IV
Subject Title	:	**SUGAR CANE AGRICULTURE**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester : 15 Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
SUGAR CANE AGRICULTURE	5	75	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME (Hours)
I	INTRODUCTION SOIL AND CLIMATE	15
II	BOTANY OF SUGAR CANE	15
III	SEED AND PLANTING	15
IV	NUTRITION AND IRRIGATION OF SUGAR CANE	16
V	QUALITY OF SUGAR CANE AND HARVESTING	14
	Total	75

RATIONALE

The sugar cane is the main raw material for sugar manufacture. In this subject, the students can know about suitable climate for sugar cane cultivation and botany of sugar cane, how to planting the sugar cane, What are the pest and diseases will attack the sugar cane, water management, applying of fertilizer, harvest and ratoon crop. These topics are very essential for sugar technology students.

OBJECTIVES

- On completion of the units of syllabus contents the students must be able to know about. The students get to know about the properties of soil.
- Climatic factors and Cane growth tells about growing phenomena of cane in different climates.
- Lodging of sugarcane deals with particular variations causes due to low temperature.
- It deals with sugarcane yield and climate.
- He comes to know about sugarcane plant parts.
- They know about sugarcane parts, and their functions here.
- He also comes to know about arrowing of sugarcane.
- He will also be able to know character for selection.
- He also learns about land preparation.
- Students get a wide knowledge about the Requirement of good seed.
- Different methods of surface soil preparation.
- In this unit students get to know about planting of sugarcane.
- He also comes to know about Germination and depth of planting.
- He will also be able to know Internal, External factors of Germination.
- Students learn about Factors influencing the chemical composition.
- Student also be able to know climate and sugarcane chemical composition.
- Students get a wide knowledge about the Fertilization of sugarcane.
- Students learn about Application of Nutrient element.
- He will also be able to know about Irrigation and Drainage system.
- Students learn about affect of climate factors on maturity.
- Students also be able to know sugar formation and storage.
- Students get a wide knowledge about methods of maturity determination.
- He will also be able to know Ratoons, Advantages & Disadvantages.

- He also comes to know about Pest, diseases and their control measure

37443-SUGAR CANE AGRICULTURE
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**INTRODUTION, SOIL AND CLIMATE** Introduction – origin of sugar cane – migration of cane – properties of soil – soil – plant relationship and cane growth – soil classification – soil organisms – soil test – soil erosion – climate in India – climatic factors and cane growth effects of temperature and sunlight on cane growth – moisture and cane growth – coordinated frost damage – drought – lodging of sugar cane – yield of sugar cane in relation to climate.	**15 Hrs**
II	**BOTANY OF SUGARCANE** Sugarcane plant - Function of various parts of sugarcane plant – stalk – node – tiller – triflorescence – sugar cane arrow – root – seed – breeding – characters for selection – quality standard – resistance to drought – technological – pests and diseases – pith –arrowing – range of parents – agro climatic regions – land preparation – schedule of operations – mechanized preparations	**15 Hrs**
III	**SEED AND PLANTING** Requirement of a good seed – final preparation of seed for cane Sugar Cane Seed Developed By Bio Tech.– disking, rolling and harrowing for surface soil preparation – effects ofpost planting traffic – planting of sugar cane – external factors andgermination – temperature, moisture, seed treatment – plant diseases– depth of planting – internal factors and germination – quality of seedused, spaced planting and strip planting for erosion control	**15 Hrs**
IV	**NUTRITION AND IRRIGATION OF SUGAR CANE** Factors influencing the chemical composition – climate and chemical composition - fertilization of sugar cane – methods of application – nutrient element – chemical composition of plant tissue – irrigation – water and its relation to soils and sugar cane – irrigation control – planting field layouts – irrigation systems – drainage – soil aeration – water logged soils –	**16Hrs**

	drainage and root systems – design of drainage systems.	
V	**QUALITY OF SUGAR CANE AND HARVESTING** Maturity – effects of climatic factors on maturity – sugar formation and storage – age in relation to maturity – methods of maturity determination – harvesting – time of harvest – tools of harvest – post harvest operations.Ratooning – disadvantages – number of ratoons – fertilizer application. Sugar cane diseases and their control – sugar cane pests and their control.	**14Hrs**

TEXT BOOKS:

1. The Growing of sugar cane by Roger P. Humbert, Elsevier publishing Co., 1968.

2. Sugar cane in India by S. V. Parthasarathy published by the K. C. P. Ltd., Madras6.

3. Cane sugar by Noel Deerr, published by Norman Rodger – 1921.

4. Technology of Sugar cane growing – Lakshmi Kandhan by Oxford & IBH New Delhi.

5. Sugar Cane production Technology – Yadav, Oxford * IBH, New Delhi, Sixth edition
– Butter worth – New Delhi – 2000

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

ENGINEERING DRAWING

CURRICULUM DEVELOPMENT CENTRE

M- SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology (Full Time)

Subject Code : 37044

Semester : IV

Subject Title : **ENGINEERING DRAWING**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Week / Hours	Semester / Hours	Marks			Duration
			Internal Assessment	Board Examination	Total	
ENGINEERING DRAWING	4	60	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

Sl.No.	TOPIC	TIME (HOURS)
UNIT-I	SECTIONSAL VIEWS AND MACHINE ELEMENTS	23
UNIT-II	ASSEMBLY DRAWING	23
UNIT-III	FREE HAND DRAWING	7
	REVISION AND TEST	7
	TOTAL	**60**

RATIONALE

Diploma Holders are required to read and interpret drawings. Therefore it is essential that they have competency in preparing drawings and sketches of various machine parts. Therefore this subject is essentially required. Drawing is said to be the language of engineers and technicians. Reading and inter prating engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use

OBJECTIVES

- Need and importance of sectional views in machine drawing.
- To show the inner parts clearly as possible.
- To identify the types of threads, bolts, nuts, keys, rivets and joints in machine elements.
- To know different terms used in connection with screw threads and drawing external metric threads.
- To know how to draw fasteners like bolt, nut and its assembly.
- To know how to draw different types of keys in shaft and hub assembly.
- To illustrate with neat sketch how two parts can be joined by rivets in different forms.

- To know various parts, how they are assembled and how do they work.
- Have an idea about the functional requirements of individual parts and their location.
- Understand the purpose, principle of operation and filed of application of the given machine part.
- Thes to prepare assembly drawing from final finished part drawings (or) pictorial drawing.
- To make free hand sketches of some important sugar technology equipments.
- Have better understanding about their function and applications.
- It is used for preparing detailed drawing of the required parts.

37044 ENGINEERING DRAWING

DETAILED SYLLABUS

UNIT - 1 SECTIONAL VIEWS AND MACHINE ELEMENTS		23 Hours
SECTIONAL VIEWS (THEORY ONLY)	:	Need for sectioning - cutting plane - Section lines - Section of adjacent components - Types of Sections - Full Section - Half Section - Removed Section - Revolved Section - Partial Section - Off set Section - Sectioning of thin and large areas - Convention of Sectioning - Material Convention.
THREADS	:	Nomenclature of Thread - Types of Threads - V.Thread - Square Thread - Right hand and Left hand thread - Internal Threads - External Threads - Single start thread - Multiple thread Draw Single Start External Metric V and Square threads.
BOLT AND NUT	:	Hexagonal and Square Nut - Bolt and Nut assembly.
KEYS	:	Sunk Key - Rectangles Key - Square Key - Gib Headed Key - Woodruff Key And Feather Key. Saddle Key - Flat And Hollow Saddle Key Round Key
RIVETED JOINTS	:	Single riveted Lap Joint - Double riveted Lap Joint (chain and Zig - Zag) - Single riveted Butt Joint (Single Strap and Double Strap).

UNIT - 2 ASSEMBLY DRAWING (ONLY TWO VIEWS)			23 Hours
Drawing Elevation and Plan (or) Elevation and End View of a component from the given part drawing or pictorial drawing.	:	Bushed Bearing for Horizontal Shaft Sleeve and Cotter Joint Flanged Coupling (Plain type) Cast Iron Flanged Pipe Joint Horizontal stuffing Box.	

UNIT - 3 FREE HAND DRAWING			7 Hours
HEAT EXCHANGES	:	Shell and Tube (1 - 1 Pass)	
EVAPORATOR	:	Standard Vertical Type	
DISTILLATION COLUMN	:	Multi Stage Tray tower	
ABSORPTION COLUMN	:	Counter Current Packed Tower	
VALVE	:	Globe Valve - Gate Valve - Check Valve	

TEXT BOOKS

1. Engineering Drawing by **P.K.Kapur and P.K.Sapra** - Tata McGraw - Hill Publishing Company Limited, New Delhi - 1990.

2. A Text Book of Machine Drawing by **P.S.Gill** - Kataria & Son Publishing House, New Delhi - 2010.

3. A Text Book of Machine Drawing by **N.D.Bhatt & V.M.Panchal -** Charotor Publishing, Anand - 2011.

REFERENCE BOOKS

1. Perry's Chemical Engineer's Hand Book by Robert H.Perry - McGraw - Hill Book Co-New York - 1994.

2. Unit Operations of SUGAR TECHNOLOGY by Warren L.McCabe, Julian C.Smith, and Peter Harriott - McGraw - Hill Higher Education - International Edition - 2001.

Board Examination - Question Paper Pattern

- Answer any 2 questions out of 3 in part A,
- PART – B and PART – C must be answered compulsory.
- Each questions in Part A, Part B and Part C carries 10,40 and 15 respectively.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

SUGAR TECHNOLOGY
PRACTICAL – I

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name	:	Diploma in Sugar Technology (Full Time)
Subject Code	:	37445
Semester	:	IV
Subject Title	:	**SUGAR TECHNOLOGY PRACTICAL – I**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
SUGAR TECHNOLOGY LABORATORY - I	5	75	Internal Assessment	Board Examination	Total	3 hrs
			25	75	100	

RATIONALE

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished doing engineering related experiments in practical classes.

GUIDELINES

All the Twelve experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..

- The external examiners are requested to ensure that a single experimental question should not be given to more than four student while admitted a batch of 30 student during Board Examinations.

LIST OF EXPERIMENTS

1. Determination of brix, pol and apparent purity of juice.
2. Determination of total solid content of sugar.
3. Measurement of P^H of juice and water using P^H meter.
4. Estimation of active Cao lime.
5. Determination of moisture content of sugar.
6. Sieve analysis of sugar.
7. Hydrolysis of sucrose.
8. Find the sugar trace of the given juice and boiler water by test.
9. Find the moisture content of the given sugar cane leaf.
10. Determination of brix the given gur sample.
11. Determination of pol, the given Juice Sample.

STUDY EXPERIMENT

12. Determination of pol% of cane.
13. Determination of mixed juice % cane and bagasse % cane.

LIST OF EQUIPMENTS

1. Hot plate
2. Polarimeter
3. Weighing scale
4. Hot air oven
5. Rapid pol extractor
6. pH meter
7. Stirrer
8. Sieve mesh
9. Small cane crushe

BOARD EXAMINATION EVALUATION
PRACTICAL EXAMINATION

ALLOCATION OF MARKS:	
Aim & Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voice	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

MOMENTUM TRANSFER PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

(Implements from the Academic year 2015-2016 onwards

Course Name : Diploma in Sugar Technology (Full time)

Subject Code : 37046

Semester : IV

Subject Title : **MOMENTUM TRANSFER PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15weeks

Subject	Instruction		Examination			
	Hours/Week	Hours/semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MOMENTUM TRANSFER PRACTICAL	6	90	25	75	100	3 Hrs

ROTIONALE

In Diploma level engineering education to skill development especially working with instruments and Equipment's play a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related equipment's in practical classes.

GUIDELINES

- All the ten experiments given in the list of experiment should be completed and given for the end semester practical examinations.
- In order to develop but best skills in handling instruct/equipment and taking reading in the practical classes.
- Every two students should be provide with a separate experimented setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimented question should not be given to more than four students while admitted a batch of 30 students during board examination.

LIST OF EXPERIMENTS

1. Determination of orifice coefficient
2. Determination of Venture Coefficient
3. Flow through a straight pipe / annular pipe
4. Flow through a spiral coil /helical coil
5. Rota Meter Calibration
6. Flow through packed column
7. Flow through fluidization column
8. Centrifugal pump characteristics
9. Flow through a Weir
10. Reciprocating pump characteristics

LIST OF EQUIPMENTS

- Orifice Meter
- Venture Meter
- Annular pipe /Straight pipe
- V notch experimental set up
- Rota Meter
- Packed column
- Fluidization column
- Centrifugal Pump
- Reciprocating Pump
- Helical coil / spiral coi

BOARD EXAMINATION EVALUATION
PRACTICAL EXAMINATION

ALLOCATION OF MARKS:	
Aim & Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voice	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(II YEAR)

M-SCHEME

IV –SEMESTER

2015-2016 On words

TECHNICAL ANALYSIS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name	:	Diploma in Sugar Technology (FT)
Subject Code	:	37047
Semester	:	IV
Subject Title	:	**TECHNICAL ANALYSIS PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester : 15 Weeks

Subject	Instruction		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
TECHNICAL ANALYSIS PRACTICAL	4	60	25	75	100	3 Hrs

RATIONALE

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

GUIDELINES

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

OBJECTIVES

To train the students on basic principles involved in estimation and Characterization of industrially important materials like Water, Oils and Fat, Soap, Fertilizers, Cement, Bleaching powder, Glycerol, Pigments and Sugar.

- To determine the water quality for various applications.

- To determine the standard quality of fat and oil for food and cosmetic grades
- To determine the quality of soap for pharmaceutical and cosmetic grades.
- To determine components present in the fertilizer.
- To determine the quality of cement.
- To determine the disinfectant quality.
- To determine the glycerol quality to meet cosmetics standards.
- To determine the pigment quality to meet paint and dying industries standards.
- To determine the purity of sugar to meet the sugar and food industry standards.

LIST OF EXPERIMENTS

1. **Analysis of Water**
   i. Hardness
   ii. pH
   iii. COD
   iv. Chlorine Content
2. **Analysis of Oils and Fats**
   i. Acid Value
   ii. Iodine Value
   iii. Saponification Value
3. **Analysis of Soap**
   i. Moisture
   ii. Total Fatty Matter
   iii. Total Alkali content
4. **Analysis of Fertilizers**
   i. Nitrogen
   ii. Potassium
   iii. Phosphorous
5. **Analysis of Cement**
   i. Moisture
   ii. Cao content
   iii. MgO content

6. Analysis of Bleaching Powder

i. Estimation of available chlorine

7. Analysis of Glycerol

i. Estimation of purity of Glycerol

8. Analysis of Pigment

i. Zinc Sulphate In Lithopone

9. Analysis of Sugar

i. Estimation of Purity of Sucrose by Munson & Walker Method.

LIST OF GLASSWARES AND EQUIPMENTS

- Burettes 50 ml
- Pipettes 25ml, 20ml, 10 ml.
- Conical flask 500 ml, 250 ml, 100 ml.
- Burette stand with clamp
- Round bottomed flask 500 ml, 250 ml.
- Liebig's condenser
- Distillation set
- Funnels
- Separating funnels
- Watch Glass 6",3",3"
- Wash bottles plastics
- Tripod stand
- Wire gauge
- Hot plate
- Muffle Furnace
- Silica Crucible with lid
- Buchner funnel
- Glass Ejectors
- Suction pump
- Aspirator bottles
- Glass tubes 5mm diameter

- Burners
- Refracto meter.

BOARD EXAMINATION EVALUATION
PRACTICAL EXAMINATION

ALLOCATION OF MARKS:	
Aim and Procedure	10 Marks
Observation	25 Marks
Calculation	30 Marks
Result	05 Marks
Viva-Voice	05 Marks
Internal Assessment	25 Marks
Total	100 Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 On words

HEAT TRANSFER

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016onwards)

Name of the Course	:	Diploma in Sugar Technology (Ft)
Subject Code	:	37051
Semester	:	V
Subject Title	:	**HEAT TRANSFER**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
HEAT TRANSFER	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	Time (Hours)
I	CONDUCTION	13
II	CONVECTION AND RADIATION	16
III	PRINCIPLES OF HEAT FLOW IN FLUIDS AND HEAT EXCHANGERS	16
IV	EVAPORATION	15
V	MULTIPLE EFFECT EVAPORATORSAND INSULATION	15
	Total	75

RATIONALE

Most of the Sugar Technology operations will involve either heat addition or heat removal in one way or the other. It is, therefore, extremely necessary to have good understanding about the heat transfer mechanisms such as conduction, convection and radiation. This subject enables the students to apply the understanding of heat transfer mechanisms such as conduction, convection and radiation for understanding the performances of various heat transfer equipment such as heat exchangers, condensers, boilers, evaporators etc. used in almost all chemical and related industries. The knowledge of this subject helps in design and fabricate different heat exchange equipment.

OBJECTIVES

On completion of the units of syllabus the students must be able to know about

- Mechanism of Heat Transfer, and Heat Transfer by conduction;
- Conduction through Composite walls and Hollow cylinders
- Variation of thermal conductivity with temperature.
- To calculate the amount of heat loss through flat wall and cylinder.
- To study the concept of convection heat transfer
- Dimensionless numbers
- To calculate the amount of radiation and the laws.
- Principles of heat transfer in fluids, log mean temperature difference
- Heat exchange equipment (double pipe, shell and tube, plate type, fin).
- To study the construction, working and application of various types of heat Transfer, equipments.
- Principle of evaporation, performance of evaporators, types of evaporators and their operational methods
- Evaporator accessories
- Multiple effect evaporators and methods of feeding
- To study some of the evaporator accessories.
- Insulating materials, need for insulation, properties and their applications.

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**CONDUCTION** Heat transfer- Modes of heat transfer– Fourier's law- steady state and unsteady state heat conduction – Heat conduction through composite walls, hollow cylinder and composite cylinders- thermal conductivity –variation of thermal conductivity with temperature – Analogy between heat conduction and electrical current flow. –simple problems.	**13 Hrs**
II	**CONVECTION AND RADIATION** Principles of convection – Types of Convection -Heat transfer without phase change – concepts of Thermal boundary layer-Heat transfer by forced convection in laminar and turbulent flow – Dimensionless numbers and their significance in heat transfer: Graetz number, Prandtl number, Nusselt number ,Froude number and Grashof number – Dimensional analysis for simple heat flow & fluid flow problems-Application of Dittus Bolter and Side- Tate equation. Heat transfer with phase change – Principles of heat transfer from condensing vapors- Dropwise and film type condensation (equations excluded) – Heat transfer to boiling liquids:Boiling of saturated liquid- natural convection, nucleate boiling, transition boiling and film boiling (principles only).-sub cooled boiling. Radiation Heat transfer- reflectivity, absorptivity and transmissivity –emission and absorption of Radiation-concept of black body and grey body – Stefan Boltzman law and Kirchoff's law.- Radiation between surfaces -Radiation to layers of liquid and gases..	**16 Hrs**

III	**HEAT FLOW IN FLUIDS AND HEAT EXCHANGERS** Principles of heat transfer in fluids- counter flow and parallel flow- Enthalpy balance in heat exchangers- Heat flux- Average temperature of fluid stream- Overall heat transfer coefficient- Derivation of overall heat transfer coefficient from hot fluid to cold fluid through a metal wall- Fouling factor-their significances- Derivation of Logarithmic mean temperature difference. Heat Exchangers: Types of heat exchangers- Double Pipe Heat Exchanger- Shell and Tube Heat Exchanger- Fixed Tube sheet 1-1 and 1-2 Shell and Tube Heat Exchangers, Plate Type Heat Exchanger, Extended Surface Heat Exchangers-Types of fins-Terminology used in heat exchangers such as shell, tube, tube sheets, baffles, guiding rods, tube pitch, passes, Heat transfer area, Overall heat transfer coefficient, correction factor for LMTD- Description, construction and working of all type of Heat exchangers-. simple problems.	**16 Hrs**
IV	**EVAPORATION** Evaporation- principles of evaporation- Liquid Characteristics, Performance of Tubular evaporators- Capacity and Economy- Methods of increasing the economy-Boiling point elevation- Duhring's rule- Effect of hydrostatic head- Enthalpy balance for single effect evaporator-simple problems on boiling point elevation and capacity of evaporator. Evaporators: Types of Evaporators- Horizontal tube evaporator, Calendria evaporator, Long vertical tube(climbing film) evaporator, Falling film evaporator, Forced circulation evaporator -construction ,operation and application of all types of evaporators.	**15 Hrs**
V	**MULTIPLE EFFECT EVPORATORS AND INSULATION** Multiple effect evaporation-Methods of feeding of multiple effect evaporator: Forward feed, Backward feed, Mixed feed and Parallel feed- Comparison- Merits and limitations. Vapor recompression: Mechanical and Thermal recompression.- Evaporator accessories:Steam traps, Entrainment separators and Salt catchers. Thermal insulation- Properties of insulating materials- Need for thermal insulation- Critical thickness of insulation- Important types of insulating materials and their specific applications. .	**15Hrs**

TEXT BOOKS

1. McCabe, W. L., Unit Operations of Chemical Engineering, 2001, Sixth Edition, McGraw Hill Book Co, Singapore.
2. Badger W. L. and Banchero J. T., Introduction to Chemical Engineering, 1997, Tata McGraw Hill Publishing Co Ltd., New Delhi
3. Gupta O. P., Elements of fuels, Furnaces and Refractories, 4th Edition, 2002, Khanna Publishers, New Delhi.
4. K.A.Gavhane, Heat Transfer, 24thedition,published by NiraliPrakashan,Pune.

REFERENCE BOOKS

1. Foust A. S., et al, Principles of Unit Operations, 1960, Wiley International Edition
2. Kern D. Q., Process Heat Transfer, 1965, McGraw Hill Book Co, Singapore.
3. Perry, Robert H., Perry's Chemical Engineers Hand Book, 1997, Seventh Edition, McGraw Hill Book Co, Singapore.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 On words

PLANTATION WHITE SUGAR MANUFACTURE

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name	:	**Diploma in Sugar Technology (FT)**
Subject Code	:	37452
Semester	:	V
Subject Title	:	**PLANTATION WHITE SUGAR MANUFACTURE**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PLANTATION WHITE SUGAR MANUFACTURE	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	TIME(Hrs)
I	MILLING AND CLARIFICATION	16
II	SETTLING, FILTRATION AND HEATING	15
III	EVAPORATION AND SYRUP SULPHITATION	14
IV	PAN BOILING	16
V	CRYSTALLISERS, CENTRIFUGAL, DRYIER AND CONVEYOR	14
	Total	75

RATIONALE

Plantation White Sugar Manufacture subject deals with the entire sugar process of milling, clarification, evaporation, pan boiling, crystallization, centrifuging, drying and conveying. The student able to know how to extract the juice from sugar cane by crushing mills, what are the chemicals used in the process, what are the chemical reaction involved in the process, how the sugar crystal formed, how to separate the molasses from centrifugal, what is the optimum temperature for sugar packing, these areas are very important for sugar technology students.

OBJECTIVES

On completion of the units of syllabus contents the students must be able to know about
The students able to know the cane crushing .

- 12 Roller Milling, Tandem, Imbibitions.
- Hot water Imbibitions and cold water Imbibitions
- Construction and operation of film type sulphur burner
- They learn about to the Mill drives
- They able to know about the factors affecting settling
- Construction and operation of SRT Clarifier
- Rotary drum vacuum filter
- Construction and operation of Juice Heater.
- Construction and operation of decanter
- They know the construction and working of 444 Rapi Dorr
- They learn about the Evaporation & Rolex's principles
- The construction and working of Vapour cell
- Methods of condensate removal.
- How the scales are formed and how it is removed.
- They able to know the principles of pan boiling
- Super saturation
- What are the types of pans
- They know about the Boiling schemes
- They able to know the theory of crystallization
- Principle and centrifugal machine
- They know the construction and working of Sugar dryers'.
- They know the construction and working of Grasshopper conveyor

37452—PLANTATION WHITE SUGAR MANUFACTURE

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
1	**I MILLING AND CLARIFICATION** **Milling: -** Cane is crushing – preparatory devices, mills – working of a 12 Roller milling tandem Imbibitions – Hot water Imbibitions and cold water imbibitions – Merits and demerits – Mill drives – Steam driven engines – electrical drive – Composition of mixed juice and the effects of various constituents in sugar manufacture. **Clarification: -** Object of clarification and fundamental aspects – Different processes of clarification – Defecation sulphitation and – Relative merits of the processes – chemicals used for the above processes – continuous sulphitation – Reaction tank – working and description of lime kiln, preparation of milk of lime – quality of lime stone, sulphur and phosphoric acid – construction and working of sulphur burner – film type sulphur burner Recent developments in clarification of techniques – Demineralization of cane juice by Ion exchange resins .	**16Hrs**
II	**SETTLING, FILTERATION AND HEATING** **Settling:** Factors affecting settling – clarifiers – Multifeed DORR – DORR 444 Rapi DORR, SRT Clarifier, working of these clarifiers. **Filteration:** Factors affecting filteration – filters – Rotary drum vacuum Filter- decanter. **Juice Heaters:** Construction and operation of juice heater – Scaling – Removal of scale-direct conduct heater.	**15 Hrs**
III	**EVAPORATION AND SYRUP SULPHITATION** **Evaporation:** Evaporation – Rilleux's principles – Object of evaporation – percentage of evaporation in a multiple effect evaporator – multiple effect evaporator – vapour cell – operation and constructional details of triple effect evaporator – quadraple effect and quintiple effect evaporator – Factors affecting efficiency of evaporators (Removal of incondensible gases and condensates) – Methods of condensate removal – principles of vapour bleeding, working of vapour cell – steam economy in evaporators – Methods of feed entry – Entrainment and entrainment catcher – Scale formation and removal – Condensers – Barometric Rain and shower type – Multi jet Barometric condenser. **Syrup sulphitation:** Syrup treatment and continuous syrup sulphitation unit	**14 Hrs**

Unit	Name of the Topic	Hours
IV	**PAN BOILING** **Pan Boiling:** Principles of pan boiling – super saturation – grain Establishment methods – waiting method – shock seeding – true seeding method – relative merits. Types of pan – coil pan – calandria pan – continuous pan – pan with mechanical circulator – Role of circulation in pan boiling – Formation of false grains and conglomerates – their causes and effects – preventive method – Molasses conditioning – Factors affecting low grade boiling – graining charge volume, graining charge purity – type of footing. Boiling schemes – 3 Massecuites and 4 Massecuites boiling schemes – pan boiling control instruments.	**16 Hrs**
V	**CRYSTALLISERS, CENTRIFUGAL, DRYIER AND CONVEYOR** **Crystallizer:** Theory of crystallization at rest and at motion – factors Affecting crystallization, growth of crystal, molasses exhaustibility – treatment of low grade Massecuites in crystallizers – Types of crystallizers – Air cooling and Water cooling crystallizers. **Centrifugal:** Principle and centrifugal machine, Centrifugal force and gravity factor – Different types of centrifugals – Belt and water driven types – Electric driven type power requirement centrifugals – Centrifugal liners – washing steaming in centrifugals, double curing – High speed centrifugals - Basket type (batch) – Description and working – Thin layer principle – Description and working of continuous centrifugal. **Dryers:** Sugar dryers, rotary dryer. conveyor: Grass hopper conveyor and sugar graders	**14 Hrs**

TEXT BOOKS

1. Handbook of Cane Sugar Engineering by HUGOT.
2. Handbook of Cane Sugar Technology by R.B.L. Mathur (Second edition). Published by
OXFORD & IBH PUBLISHING, Pvt., Ltd., (New Delhi).

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 On words

PROCESS INSTRUMENTATION AND CONTROL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016onwards)

Course Name : Diploma in Sugar Technology **(Full Time)**
Subject Code : 37053
Semester : V
Subject Title : **PROCESS INSTRUMENTATION AND CONTROL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROCESS INSTRUMENTATION AND CONTROL	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	Time (Hours)
I	BASIC CONCEPTS OF MEASUREMENT ANDMEASUREMENT OF TEMPERATURE	13
II	MEASUREMENT OF PRESSURE	13
III	MEASUREMENT OF FLOW, LIQUID LEVEL AND HUMIDITY.	13
IV	PROCESS CONTROL	19
V	COMPUTERIZED PROCESS CONTROL	17
	Total	75

RATIONALE

This subject gives the knowledge of various instruments used to measure various processes parameters. This course will impart knowledge on working principle, construction, repair, and use of these instruments, This course will make the students knowledgeable in various types of measuring instruments used in chemical process industries.

The diploma holder in Sugar Technology has to deal with all kinds of equipment's in the chemical industry. This subject provides him/her thorough knowledge of uses, types and constructional details of heat transfer, mass transfer equipment's along with pumps, blowers, compressors, crushers and screens.

OBJECTIVE

- To understand the application of various Industrial instruments & control
- System to measure the process variables
- To know the necessity of studying Instrumentation
- To list out various Temperature measuring Instruments
- To list out various pressure measuring Instruments
- To understand the working of various temperature measuring Instruments
- To understand the working of various pressure measuring Instruments
- To list out various Flow measuring Instruments
- To list out various Liquid level measuring Instruments
- To measure the Flow rate using different flow measuring Instruments
- To handle various level measuring Instruments
- To understand the operation of different Humidity measuring Instruments
- To understand the significance of automatic control system.
- distinguish the various modes of control actions
- To understand the principle of various controllers
- To understand about transmission of both analog and digital signals
- To understand the concept about Distributed Controlled System and its applications.

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**BASIC CONCEPT OF MEASUREMENT AND MEASUREMENT OF TEMPERATURE** Purpose of Instrumentation – Measurement and its aim- Functional elements of Instruments – Static and Dynamic characteristics of Instruments - Signaling and Recording Instruments – Circular and Strip chart- Instrumentation diagram. Temperature measuring Instruments- Methods of temperature measurement- Liquid filled thermometer- Gas filled Thermometer- Bimetallic Thermometer- Electrical Resistance Thermometer - Thermocouples – Thermistor – Radiation Pyrometer- optical pyrometer- Temperature Transmitter.	**13 Hrs**
II	**MEASUREMENT OF PRESSURE** Pressure- Units of Pressure- Different types of pressure- Methods of pressure measurement. Bourdon gauge - Bellow and Diaphragm pressure sensors. Vacuum measurement - Pirani gauge - Ionization gauge. Electrical pressure Transducers - Strain gauge pressure Transducers – Potentiometric pressure Transducers- Differential pressure Transmitter- Piezoelectric Pressure Transducer- Linear Variable Differential Transformer (LVDT).	**13 Hrs**
III	**MEASUREMENT OF FLOW ,LIQUID LEVEL AND HUMIDITY** Flow measurement: Introduction- Methods of flow measurement- Orifice meter–venturimeter- Rotameter- Pitot tube- Weirs and Flumes- Electromagnetic Flowmeter- Turbine flow meter- Nutating Disc type. Liquid level measurement: Introduction- Methods of level measurement- Sight glass- Float-tape level indicator- Air purge system- Capactive and Conductivity type level sensor- Radiation level detector- Bin and Diaphragm type.Humidity measurement: Hair Hygrometer – sling Psychrometer.	**13 Hrs**

IV	**PROCESS CONTROL** Automatic control system –significance –Terminology used in control system: controlled variable, manipulated variable, set point, etc,.-General process control system: open loop system ,closed loop system ,Feed back control system, Feed forward control system and Ratio control system (Principles and Purposes only)-Block diagram-elements of process dynamics – static and dynamic behavior of process-process lag-dead time-process degree of freedom.- concept of using Transfer function in process control. Automatic controllers: controllers- classification; based on control action such as P,I,PI,PD,PID – based on actuating medium such as Pneumatic, Hydraulic and Electronic(concept and application only in Pneumatic system) –Actuators-Pneumatic Relays- Final control element: control valves, variable speed drives and variable electric power actuator. Control application in(a)liquid level system (b) Heat Exchanger- control of temperature and flow rate. (c) Batch Reactor- control of temperature and pressure.	**19Hrs**
V	**COMPUTERIZED PROCESS CONTROL** Modes of signal-Transmission of Analog signal-electronic and pneumatic methods- Transmission of Digital signal - Data logging and transmission using computer-conversion of analog signal into digital vice-versa. Process control computers: Analog computer system, Digital computer system-Features of both types- application of Distributed Controlled System(DCS) in unit operation ,unit processand plant control-schematic diagrams for the control of simple unit process-computer supervisory control-simple control flow sheets using computer for Batch reactor and CSTR. Simulation: Basic concepts-Analog simulation ,Digital simulation and Hybrid simulation-characteristics of each types-basic concepts in writing mathematical models.	**17Hrs**

TEXT BOOKS

1. Industrial Instrumentation by Donald Eckman , Allied Publishers, 1982
2. Industrial Instrumentation and control by S.K Singh , Twelfth edition, Tata McGraw Hill Publishing Company Ltd ., New Delhi.
3. Automatic Process Control by Donald P.Eckman, Sixth edition, Wiley Eastern Limited.
4. Computer Control of Processes by M.chidambaram, Narosa Publishing House.

REFERENCE BOOKS

1. Perry's Chemical Engineering Hand book, Seventh edition, Robert H. Perry, McGraw Hill Book Company, Singapore – 1997.
2. Process Modeling, Simulation and control for Chemical Engineers by Luyben, McGraw Hill Kogakasha Ltd.
3. Chemical process control by George Stephanopoulos, PHI learning PVT Ltd.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016
ON WORDS

PROCESS EQUIPMENT CAPACITIES

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016onwards)

Course Name : Diploma in Sugar Technology (Full Time)
Subject Code : 37471
Semester : V
Subject Title : **PROCESS EQUIPMENT CAPACITIES**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 15weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
PROCESS EQUIPMENT CAPACITIES	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPICS	Time (Hours)
I	LOCATION AND MILLING SECTION	15
II	CLARIFICATION, SETTLING AND FILTRATION	15
III	EVAPORATOR-CONDENSER-VACUUM PANS	15
IV	MOLASSES STORAGE TANKS: CRYSTALLIZERS AND CENTRIFUGALS	15
V	CONVEYOR – SUGAR DRIER – BOILER X	15
	Total	75

RATIONAL

This course helps the students to understand the various processes involved in Sugar Industries for the production and process

OBJECTIVES

On completion of the units of syllabus contents the students must be able to know about

- They know about what are the factors needed to commence the factory.
- They know about the preparatory devices and mills.

- They know about the function of juice weighing scale.
- Table to know about how to calculate heating surface of juice heater.
- He knows able to calculate the capacity of sulphitation tanks.
- He knows about the working of carbonation tanks.
- He knows about the working of lime slaker and storage capacity.
- He knows about how many filters required for the given sugarplant.
- He knows about the percentage of evaporation.
- He knows about how the vapour bleeding is done in evaporator.
- He knows about the requirement of injection water.
- He knows how to calculate the spray pond number and size of nozzles.
- He knows to calculate the capacity of molasses and syrup storage tanks.
- Distribution crystallizers for different grade of massecuites.
- Equation for centrifugal force.
- Requirement for centrifugals.
- Knows the length and breath of grasshopper for the plant capacity.
- He knows to calculate the blower capacity.
- He knows about capacity the screw conveyor.
- Capacity of final molasses storage tanks.
- Knows how to calculate power plant capacity

37471- PROCESS EQUIPMENT CAPACITIES

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**LOCATION AND MILLING SECTION** Location and site selection for sugar factory layout – Plan of a sugar factory – gravity plant – Non-gravity plant – Relative merits – capacity calculation of cane carrier length and power requirement – preparatory devices – mills – different formulae for mill capacity – power required for mills – Mixed juice pump – Strainers, imbibition pump – mixed juice weighing tank – juice weighing scales – juice heaters – heating surface, tube sizes	**15Hrs**
II	**CLARIFICATION, SETTLING AND FILTERATION** Capacity of sulphitation tanks (Batch and continuous type) – Sulphur furnace – tray area and air requirement – Lime slaker and storage capacity of milk of lime tank – Settling tanks – tray area of batch settling – tanks and continuous clarifiers. Rotary vacuum filter diameter and length filtering area required.	**15Hrs**
III	**EVAPORATOR – CONDENSOR – VACUUM PANS** **Evaporator:** Percentage of evaporation in a multiple effect evaporator –Assumption of evaporation rates for triple, quadraple effect evaporator– quantity of vapour available – bleeding of vapour – calculation of vapour pipe diameter – tube sizes. **Condensers:** Injection water requirement and pump capacity, capacities of vacuum pump and spray pump – spray pond – number and size of nozzles. **Vacuum pans:** Calculation A, B, C Massecuite percentage for a sulphitation plant of given capacity – number of pans required – heating surface of pans – calculation of capacities based on heating surface and volume ratio – total.	**15Hrs**

Unit	Name of the Topic	Hours
IV	**MOLASSES STORAGE TANKS: CRYSTALLISERS AND CENTRIFUGALS** Capacity of molasses and syrup storage tanks for a given crushing rate of a mill. **Crystyallisers:** Number and size, total capacity required – Distribution of crystallisers for different grade of massecuites. **Centrifugals:** Equation for Centrifugal force – gravity factor – Sizes of different machines and their capacity – Number of machines required for a given crushing rate of a factory – fore workers and after workers different massecuites – power requirement for centrifugals – requirement of water and steam for washing and drying in centrifugals	**15Hrs**
V	**CONVEYOR – SUGAR DRIER – BOILER** **Conveyor:** Length and breath of Grosshopper – conveyor for a given crushing rate – Blower capacity – Bucket elevator capacity. **Sugar drier:** Screw conveyor – Horse power of sugar grades drive – Number of decks and mesh sizes of grades – Sugar weighing scale capacity – capacity of final molasses storage tanks **Boiler:** Heating surface of the boiler, Efficiency Of The Boiler	**15Hrs**

TEXT BOOKS

1. Hand Book of Sugar Engineering by HUGOT
2. Hand Book of Sugar Engineering by JENKINS

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 On words

BY PRODUCTS AND CORROSION IN SUGAR INDUSTRIES

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology (FULL TIME)

Subject Code : 37472

Semester : V

Subject Title : **BY PRODUCTS AND CORROSION IN SUGAR INDUSTRIES**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester : 15Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
PRODUCTS AND CORROSION IN SUGAR INDUSTRIES	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	Time (Hours)
I	BAGASSE	15
II	MOLASSES	15
III	SUGAR CANE TRASH AND FILTER CAKE	15
IV	CORROSION PROBLEM IN SUGAR INDUSTRY AND PREVENTIVE MEASURE	15
V	MONEY LOSS FOR CORROSION AND MODERN COOLING SYSTEM	15
	Total	75

RATIONALE

By making sugar from sugar cane we get final product of sugar and three valuable by products such as bagasse, filter cake, and molasses. Now a days there is a shortage of sugar cane in all over India. Hence the management facing financial problem. For make up the financial problem the management force to start co generation plant, paper plant and distillaries. The above mentioned plants are using their own raw materials from By – products of sugar manufacture. Now a days the

repairing and maintenance cost also increased to avoid this corrosion control also vital role for the industry. The sugar technology students are able to know about money loss for corrosion and how to utilize the by product

OBJECTIVE

On completion of the units of syllabus contents the students must be able to know about

- The students able to know, what is bagasse and its composition.
- Uses of bagasse.
- They able to know uses of furfural,
- He know about how to produce current from bagasse.
- The students able to know, what are products available from molasses.
- He know about, how to manufacture of alcohol from molasses.
- Uses of molasses.
- They know about difference between the cane and beet molasses.
- He able to know about uses of sugar cane tops.
- The student able to know about soil reclamation.
- How the filter cake use for distillery effluent treatment.
- He knows about comparison of wax and wax extraction.
- The students able to know, how corrosion formed to equipments.
- What are the steps to be followed to avoid corrosion?
- He know about, how corrosion affect the buildings.
- The students to know about, what are the other factor for formation of corrosion.
- The students able to know about, a source of water comes to injection channel.
- This unit deals with, how money hours various station during crushing season due to corrosion.
- The students know about construction and working of modern cooling towers.
- For what purpose we cool the injection water.

37472-BY PRODUCTS AND CORROSION IN SUGAR INDUSTRIES
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**BAGASSE** Introduction about by products – Bagasse – Definition – Physical and chemical composition of bagasse – Calorific value of bagasse – Grass value – Nett value – Bulk density – Storage of bagasse – Absorptive capacity of bagasse. Direct and indirect utilization as fuel – Electricity – paper – paper boards – News print – composition of fibre percentage in other material – Manufacture of fibre board and particle board – production of furfural and acetic acid from bagasse uses of furfural bagasse ash – composition of bagasse ash.	**15Hrs**
II	**MOLASSES** Definition – composition of beet molasses – Cane molasses – different grades of molasses. Utilization of animal feed – fertilizer – confectionary. Manufacture of industrial alcohol, absolute alcohol, rum, rectified spirits. Production of citric acid, lactic acid, oxalic acid, maleic acid, Itaconic acid, butyric acid, vinegar. By-product of ethyl alcohol – uses of alcohol	**15 Hrs**
III	**SUGAR CANE TRASH AND FILTER CAKE** Sugar cane tops – cane trash – cardboard and packing paper from trash – Definition – composition of dry filter cake – wet filter cake – thickness – utilization of fertilizer, soil reclamation – procedure for soil reclamation with raw spent wash – sugar cane wax – composition of soft wax – extraction of wax from filter cake – process of refining of crude wax – sterols – flow chart of solvent extraction of crude sugar cane wax – sugar loss in cake	**15 Hrs**
IV	**CORROSION PROBLEM IN SUGAR INDUSTRY AND PREVENTIVE MEASURE** Corrosion areas – cane carrier, cane kicker, cane cutter, cane milling, Juice pipe lines, pumps, vessels, weighing scale, Juice heaters, sulphiters,SO2 gas production plant, lime station, Evaporator vacuum pans, centrifugals, hopper, blower, elevator grader, sugar storage bin, Injection and spray system, Boilers, building foundation and structure – other factors	**15Hrs**

V	**MONEY LOSS FOR CORROSION AND MODERN COOLING SYSTEM** Break document – replacement cost of pipe, pump, roller, evaporator tube, vapour pipes, boiler, etc., ideal time of machines and men. Labour wages, over time deterioration of cane juice, syrup, massecuite, molasses, inversion of sugar, sources of water to injection channel – temperature pH of inlet and outlet injection water – reason to cooling the injection water – types of cooling towers – induced draft counter flow cooling towers – induced draft cross flow cooling towers – natural draft fill ness cooling towers – construction and working	**15Hrs**

TEXTBOOKS

1. Sugar by product and subsidiary Industrial by R.S. Dubey and N.C. Varma. Published by Deccan sugar Institute Pune India.
2. Hand book of Cane sugar Engineering by Hugot.
3. By product of Cane sugar Industries by J.M. Paturaw (3rd edition) Elseiver 1989.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 ON WORDS

CHEMICAL PROCESS MEASUREMENT AND CONTROL PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology (Full Time)

Subject Code : 37055

Semester : V

Subject Title : **CHEMICAL PROCESS MEASUREMENT AND CONTROL PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CHEMICAL PROCESS MEASUREMENT AND CONTROL LABORATORY	5	75	25	75	100	3 Hrs

RATIONALE

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

GUIDELINES

All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS

1. Characteristics of different temperature sensors like Thermocouple module, RTD and Thermistor module.
2. Measurement of Pressure using Strain Gauge type Transducer
3. Measurement of Pressure using Bourdon Pressure Transducer
4. To study the linearity of P/I and I/P converter.
5. Level measurement by using Air purge method and Differential Pressure (DP) Transmitter.
6. Study of valve flow coefficients and inherent characteristics of Linear, Equal% and Quick opening.
7. Study of ON- OFF controller using Temperature controller Trainer kit by monitoring the process in SCADA mode.
8. Study of P,PI and PID controller using Liquid Level controller Trainer kit by monitoring the process in SCADA mode.
9. Study of P, PI and PID controller using Pressure controller Trainer kit by monitoring the process in SCADA mode.
10. Study of multidrop communication system for temperature, pressure and Level control Trainer kit (ON-OFF and PID Controller) in SCADA mode.

LIST OF EQUIPMENTS

1. Temperature sensors like Thermocouple, RTD and Thermistor.
2. Strain Gauge type Pressure Transducer.
3. Bourdon Pressure Transducer.
4. P/I and I/P converter.
5. Differential Pressure Transmitter.
6. Pneumatic control valve (Linear, Equal % and Quick opening) set up.
7. Temperature control Trainer Kit with SCADA.
8. Liquid Level control Trainer Kit with SCADA.
9. Pressure Control Trainer Kit with SCADA.
8. Multidrop communication system.

BOARD EXAMINATION EVALUATION
PRACTICAL EXAMINATION\

ALLOCATION OF MARKS:	
Aim and Procedure	10 Marks
Observation (including taking	25 Marks
Calculation	30 Marks
Result	05 Marks
Viva-Voice	05 Marks
Internal Assessment	25 Marks
Total	100 Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 ON WORDS

SUGAR TECHNOLOGY PRACTICAL - II

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name	:	Diploma in Sugar Technology (FT)
Subject Code	:	37456
Semester	:	V
Subject Title	:	**SUGAR TECHNOLOGY PRACTICAL - II**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
SUGAR TECHNOLOGY LABORATORY - II	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

RATIONALE

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

OBJECTIVES

- All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..

- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS:

1. Estimation of reducing sugars from juice by luff's method.
2. Estimation of reducing sugars from juice by potassium ferric cyanide method.
3. Estimation of sucrose by Jackson and Gillis method.
4. Determine the Brix, Pol and apparent purity of Gur.
5. Estimation of color from sugar cane juice.

6. Prepare the B.T.B test papers in the lab and test the P^H of Juices.
7. Estimation of Cao content in juice.
8. Estimation of $p_2 o_5$ content the given triple sugar phosphate sample.
9. Determination of sulphitation ash the given molasses sample.
10. Qualitative test for carbolaydrates (dext rose).
11.Calculate the size of the sugar crystal

12. Study Experiment:-
Find the purity of Hot nutch from C - massecuite by Nutch apparatus.

LIST OF EQUIPMENTS:

1. Hot plate

2. Polarimeter

3. Weighing scale

4. Hot air oven

5. Rapid pol extractor

6. Stirrer

7. Calorimeter

8. Microscope

9. Muffle Furnace

QUESTION PAPER PATTERN

ALLOCATION OF MARKS:	
Aim and Procedure	10 Marks
Observation	15 Marks
tabulation	15 marks
Calculation	20 Marks
Result	10 Marks
Viva-Voice	05 Marks
Internal Assessment	25 Marks
Total	100 Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

V –SEMESTER

2015-2016 ON WORDS

LIFE AND EMPOLYABILITY SKILL PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

. **STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

DIPLOMA IN ENGINEERING – SYLLABUS – M Scheme

(Being implemented from the Academic Year 2016-2017 onwards)

Course Name : **All Branches of Diploma in Engineering and Technology and Special Programmes**

Subject Code : **30002**

Semester : **V**

Subject Title : **LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

Teaching and Scheme of Examination: **No. of Weeks per Semester: 15 Weeks**

Subject	Instruction		Examination			
			Marks			
	Hours/ Week	Hours/ Semester	Internal assessment	Board Examination	Total	Duration
Life and Employability Skills	4 Hours	60 Hours	25	75	100	3 Hours

Topics and Allocation of Hours:

Sl. No.	Section	No. of Hours
1	**Part – A** Communication	**30**
2	**Part – B** Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools& Labour Welfare	**20**
3	**Part – C** Environment, Global Warming, Pollution	**10**
TOTAL		**60**

RATIONALE

Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

SPECIFIC INSTRUCTIONAL OBJECTIVES

1. **Emphasize and Enhance Speaking Skills**

2. **Increase Ability to Express Views & Opinions**

3. **Develop and Enhance Employability Skills**

4. **Induce Entrepreneurship and Plan for the Future**

5. **Expose & Induce Life Skills for Effective Managerial Ability**

LIFE AND EMPLOYABILITY SKILLS PRACTICAL SYLLABUS

Unit	Topics	Activity	Hours
I	**Communication, Listening, Training, Facing Interviews, Behavioural Skills**	-- instant sentence making – say expressions/phrases-- self- introduction/another higher official in company – describe/explain product – frame questions based on patterns – make sentences based on patterns	**30**
II	**Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement**	-- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur – prepare a resume	**10**
III	**Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping**	-- search in the website -- prepare a presentation – discuss & interact	**05**
IV	**Occupational Safety, Health Hazard, Accident & Safety, First-Aid,Labour Welfare Legislation, Welfare Acts**	-- search in the website -- prepare a presentation – discuss & interact	**05**

V	**Environment, Global Warming, Pollution**	-- taking down notes / hints – answering questions -- fill in blanks the exact words heard	**10**

LEARNING STRUCTURE **100 Marks**

-- Focus more on Speaking & Listening Skills
-- Attention less on Reading & Writing Skills
-- Apply the skills in fulfilling the Objectives on Focused Topics

a) Listening **25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints) **10**
2. Cognitive Skills (answering questions) **10**
3. Retention Skills (filling in blanks with exact words heard) **05**

b) Speaking Extempore/ Prepared **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**
3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**

c) Writing & Reading **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare outline of a project) **05**

d) Continuous Assessment (Internal Marks) **25 Marks**

(search,read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills& Interactive Skills (after listening, discuss)

Note down and present in the Record Note on any 5 topics **10 Marks**
Other activities recorded in the Record note **10 Marks**
Attendance **05 Marks**

INTERNAL MARKS **25 MARKS**

EXTERNAL MARKS AT END EXAMINATION **75 MARKS**

MODEL QUESTION

Time: 3 Hours **Maximum Marks: 75**

A. LISTENING **25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING **30 Marks**

1. Say in a sentence instantly on hearing the word(5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department. Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	
d.	These	are	the new products	launched	by our company
e.	Almost everyone	come	to the company	on motorbikes	

3. Prepare a resume for the post of Department Manager. 05

4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

I. Guidelines for setting the question paper:

A. LISTENING :

ONLY TOPICS related to
POLLUTION /
ENVIRONMENT /
GLOBAL WARMING are to be taken.
These topics are common for all the three types of evaluation.

B. SPEAKING :

1. WORDS of common usage
2. Fragments – expression of politeness, courtesy, cordiality
3. Introduce yourself as an engineer with designation or
   Introduce the official visiting your company/department

4. Describe/Explain the product/machine/department
5. Dialogue must be with someone in the place of work.
6. Group of six/eight
   Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

1. Provide five different structures.
   Students are to substitute at least one with some other word/words
2. Provide five different structures.
   Students are to substitute at least one with some other word/words
3. Provide some post related to industries.
4. Outline of the project (skeleton/structure)
   Only the various headings and subheadings
   Content is not needed

II. Guidelines for recording the material on the Focused Topics in the Record note.

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
(5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights

9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

LABORATORY REQUIREMENT:

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4.A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29")
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:

1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley & Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016
ON WORDS

PLANT ENGINEERING AND MANAGEMENT

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name	:	**Diploma in Polymer Technology (Full Time)**
Subject Code	:	37561
Semester	:	VI Semester
Subject Title	:	**PLANT ENGINEERING AND MANAGEMENT**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PLANT ENGINEERING AND MANAGEMENT	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	Time (Hours)
I	**PRINCIPLES OF MANAGEMENT**	15
II	**ORGANISATION AND QUALITY CONTROL**	15
III	**MARKETING FUCNTIONS-INDUSTRIAL RELATIONS AND SAFETY**	15
IV	**ENVIRONMENT MANAGEMENT**	15
V	**DISASTER MANAGEMENT**	15
	Total	75

RATIONALE:

In this subject the basic concepts on the various principles of management about scientific management, entrepreneurship, different types of organanisation are covered to enable the students to understand working of various management principles. Students also get an opportunity to learn about PPC, Leadership and the modern quality control techniques.

In this subject due emphasis is given for marketing functions, Industrial relation and safety and also Environmental management and disaster management techniques which are highly essential for the present situation.

OBJECTIVES:

On completion of the units of the syllabus, the student will be able to understand the following :

- To understand the different types of ownership in industry
- To understand the scientific management

- To organise the different activities of the plant
- To develop the traits required for entrepreneur
- To select the plant location and product
- To acquire better knowledge about decision making and communication
- To understand the important factors of production planning control
- To carryout suitable effective methods for inventory control
- To maintain good quality control
- To understand the various quality certification schemes
- To understand the different marketing techniques
- To promote the products with effective methods
- To select the suitable advertising techniques
- To understand the different factory acts for employee welfare
- To appraise the safety performance
- To understand the importance of pollution control
- To analyse the impact of pollution
- To select the suitable solid waste treatment techniques
- To understand various treatments and disposal methods for waste water
- To choose the suitable air pollution control methods
- To understand the disaster management
- To identify different causes for disaster management
- To understand various preventive measures and warning systems
- To estimate the arrangements required in industry to avoid disaster
- To understand the insurance claim and rehabilitation methods

37561 - PLANT ENGINEERING AND MANAGEMENT

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**UNIT I: PRINCIPLES OF MANAGEMENT (12 hours)** Role of industry –Types of ownership-Proprietorship, partnership-Private limited –Public limited –Industrial co-operatives –Scientific management –Functions of management –Types of organization –line-staff-functional organization – concept and Definition –Importance of Entrepreneurship – Promotion of self employment –Government policies - Advantages and limitations of entrepreneurship –Site selection – Principles of plant layout –Factors influencing plant location. Plant maintenance – importance – Break down maintenance, preventive maintenance and scheduled maintenance.	**15 Hrs**
II	**UNIT II: ORGANISATION AND QUALITY CONTROL (12 hours)** Leadership in organization –Decision making –Communication – Motivation –Group dynamics –Production planning and control – Need for planning –Routing –Scheduling –Despatching –PERT – CPM –Inventory control –ABC analysis of safety stock –EOQ method –Purchasing procedures –Records –Bin cards - Quality control –Basic concepts –Definition –Terminology –Presentation of data –Indian standards on quality control technique –Quality certification schemes –ISO 9000 etc.	**15 Hrs**
III	**UNIT III MARKETING FUNCTIONS, INDUSTRIAL RELATIONS AND SAFETY (13 hours)** Marketing –Definition –Information –Functions –Pricing policy – Pricing techniques - Sales –Definition –Personal selling – Promotion mix –Advertising –Sales packaging –Promotion techniques Trade unions –Disputes –Settlement –Collective bargaining – Welfare concepts –Rights and responsibilities of employer and employee –Factories act 1948 –Industrial dispute act 1947 – Trade unions act 1926 –ESI act 1948 –Child labour act Process safety –Hazard analysis –Risk analysis –Common causes of accidents –Safety training –Electrical hazard –Fire hazard –Explosion hazard –First aid.	**15 Hrs**

IV	**UNIT IV: ENVIRONMENTRAL MANAGEMENT (15 hours)** Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution. Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies. Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health. Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management. Noise pollution management – Effects of noise on people – Noise control method**s.**	**15 Hrs**
V	**UNIT V: DISASTER MANAGEMENT (16 hours)** Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life. Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems. Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbours / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.	**15 Hrs**

Text book:

1. O.P.Khanna Industrial engineering and management, Dhanpat rai & sons.
2. C.S.Rao - Environmental Engineering and Pollution control, Wiely

Reference Books:

1. Industrial Management by Dalilal & Mansur Ali
2. Hand Book of “Industrial Safety and Health, Trade and Technical Press Ltd., Modern, U.K. 1980.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016
ON WORDS

MILLING AND CHEMICAL CONTROL

CURRICULUM DEVELOPMENT CENTRE

M – SCHEME
(Implements from the Academic year of 2015 – 2016 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject code : 37462
Semester: : VI Semester
Subject Title : **MILLING AND CHEMICAL CONTROL**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
MILLING AND CHEMICAL CONTROL	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	**TOPIC**	**TIME (hours)**
I	CHEMICAL CONTROL AND DEFINITIONS	14
II	MILLING CALCULATIONS	17
III	MILLING CONTROL	14
IV	BOILING HOUSE CONTROL	17
V	EFFLUENT TREATMENT PLANT IN SUGAR INDUSTRY.	13
Total		75

RATIONALE:

The accumulation of sucrose present in the sugar cane to convert the crystal form of sucrose [eatable sugar] by lengthy process. What ever quantity of sucrose present in the harvest cane, we can't get the same quantity of sugar by process, because there is a some losses in mill station and boiling house station. The loss of sucrose should be minimum otherwise there is a great money lost for management . In this subject the students able to know, how to control the sugar loss during the process.

OBJECTIVES: -

On completion of the units of syllabus contents the students must be able to know about

- He knows what is chemical control .
- He knows the definitions of cane, bagasse
- He knows the definitions of secondary juice, mixed juice.
- He knows the definitions of lost juice, added water.
- He knows the determination of pol % cane.
- He knows to calculate the added water extracted in mixed juice % cane.
- He knows to determine the lost juice % Fibre.
- He knows to determine the reduced Mill extraction.
- He knows to determine the brix free cane % fibre.
- He knows how the sugar is lost by micro organism.
- He knows to derive the formulae for primary extraction.
- He knows to calculate Brix curves.
- He knows to calculate ideal Brix.
- He knows the types of imbibitions and its merits and demerits.
- Definition of true purity, gravity purity .
- Definition of standard granulated, equivalent standard granulated.
- Definition of boiling house extraction .
- Definition of reduced Boiling house extraction, virtual purity of molasses.
- Derivation of S.J.M formula .
- He able to know about the general parameters in effluent .
- He knows the sources of effluent.
- He knows how to minimize of wastewater.
- He knows how the effluents are treated in factory side.

37462 MILLING AND CHEMICAL CONTROL
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CHEMICAL CONTROL AND DEFINITIONS** Definition of chemical control – importance of chemical control in sugar factory - definitions of cane, bagasse, primary juice, secondary juice, mixed juice, last mill juice, residual juice, undiluted juice, fibre, pol, Brix, purity, mill extraction, lost juice, added water, absolute juice – direct method of determination of pol % cane, fibre % cane, mixed juice % cane, bagasse % cane, added water % cane.	**14Hrs**
II	**MILLING CALCULATIONS** Calculation of added water extracted in mixed juice % cane and added water extracted in Mixed Juice % added water in cane and undiluted juice lost in bagasse % fibre. Determination of lost juice % fibre and reduced mill extraction – calculation of brix free cane % fibre – F. B. C. W. – and its meaning – mill sanitation and its importance – Micro organism causing loss of sugar in milling.	**17Hrs**
III	**MILLING CONTROL** Derivation of formulae for primary extraction – Brix curves –calculation of ideal brixes and interpolation of results – calibration of vessels and weighing equipments – dirt and foam correction – imbibition on maceration – simple and compound imbibition – hot and cold water imbibition – relative merits.	**14 Hrs**

Unit	Name of the Topic	Hours
IV	**BOILING HOUSE CONTROL** Definition of true purity, gravity purity, gravity solids, refractive solids, ash, standard granulated, equivalent standard granulated (E.S.G). Boiling house extraction – reduced Boiling House extraction, virtual purity of molasses, Boiling house efficiency, overall extraction, reduced overall extraction, recovery % cane – derivation of S. J. M. formula – winter formula. virtual purity of molasses and reduced boiling house extraction – clarification factor and calculation oftheoritical molasses % cane – stock taking – preparation of Polbalance, non-sugar balance – Brix balance and crystal balance.	**17 Hrs**
V	**EFFLUENT TREATMENT PLANT IN SUGAR INDUSTRY** General parameters – Total solids – Total suspended solids – Total dissolved solids – Bio-chemical oxygen demand – chemical oxygen demand – oxygen absorbed value – pH.Sources of effluent – mill house – Boiling house – occasional leaks Excess of spray pond water – Minimization of wastewater.Process of treatment – Primary treatment – Secondary treatment –Tertiary treatment – uses of treated effluent.	**13 Hrs**

REFERENCE BOOKS:

1. Technical control for cane sugar factories in India by N.C. VARMA.
2. Handbook of Cane Sugar Technology by R.B.L. MATHUR (second edition). Published by OXFORD & IBH PUBLISHING Co., pvt., ltd. New Delhi.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

UNIT OPERATIONS

CURRICULUM DEVELOPMENT CENTRE

M – SCHEME
(Implements from the Academic year of 2015 – 2016 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject code : 37481
Semester : VI Semester
Subject Title ; **UNIT OPERATIONS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
UNIT OPERATIONS	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPICS	TIME (Hrs)
I	DISTILLATION, ABSORPTION AND ADSORPTION	15
II	EXTRACTION AND CRYSTALLIZATION	13
III	DRYING AND HUMIDIFICATION	15
IV	SIZE REDUCTION, SCREENING AND CONVEYING	15
V	GRAVITY SEDIMENTATION, FILTRATION, CENTRIFUGES AND DUST COLLECTOR	17
	Total	75

RATIONALE:

The students of sugar technology can learn various distillation process, purpose of crystallization, operation of dryers and their application in industries, cooling towers, air conditioning system, working of crushers and grinders, conveyor, Importance of sedimentation, the working principle of filtration equipments and its industrial application.

OBJECTIVES:

On completion of the units of syllabus contents the students must be able to know about

- He gets an idea about vapour-liquid equilibrium.
- How to separate a liquid mixture of miscible and volatile substances , inert gases..
- He gets an idea about adsorbents used.
- He learns about the basic principle for extraction and crystallization process.
- How to separate one component from its mixture when separation by distillation is ineffective (or) very difficult.
- He learns about the commercial dryers available.
- He gets knowledge about crushing and grinding equipments and how industrial screens are operated and used.
- Which type of conveyor is applicable for conveying slurries, solids, food materials, cars etc.
- He gets knowledge about gravity sedimentation and filtration equipments used industrially.
- How to separate solids from it's mixture with liquids by using centrifuges.
- He gets knowledge about gas cleaning and dust collectors.

37481 UNIT OPERATIONS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**DISTILLATION, ABSORPTION AND ADSORPTION** **Distillation: -** Raoult's law and Henry's law – Vapour liquid equilibrium – Types of distillation – Simple distillation – Flash distillation – Batch distillation –Rectification – Pipe stills – fractionating column – Bubble plate columns and packed columns – Description and applications only (Calculation of number of trays is excluded). Absorption: - Principles – factors influencing rate of absorption – Types of equipment used – packed and spray columns –packing materials. **Adsorption: -** Principle – Industrial adsorbents – operation of adsorption columns.	**15Hrs**
II	**EXTRACTION AND CRYSTALLIZATION** **Extraction:** Elementary principles – diffusion – factors influencing rate of extraction –Types of extraction – spray column and Mixer settlers. Crystallization: Principles – purposes of crystallization – separation, purification, concentration and solidification – solid – liquid equilibria – yield –super saturation – mechanism of Crystallization. Types of crystallizers – Cooling Crystallizers – Evaporative Crystallizers –Evaporative Cooling and salting out crystallizers - Mono vertical crystallizer	**13 Hrs**
III	**DRYING AND HUMIDIFICATION** **Drying: -** Principles of drying – Dry basis – wet basis moisture content – Equilibrium moisture – Bound moisture – Unbound moisture – Free moisture. Types of dryers and their applications – Tray dryer – Rotary dryer – Fluidized bed dryer – Drum dryer –Description and operation of the above equipments. **Humidification: -** Humidification – psychrometric chart – Methods of humidification –Air conditioning and cooling towers.	**15 Hrs**

IV	**SIZE REDUCTION, SCREENING AND CONVEYING** **Size reduction:** - Crushing and grinding equipments – Roll crushers – Hammer mill – Ball mill – Energy mill. **Screening: -** Screening – Standard screening sieves – Industrial screens – elements of classification – pneumatic and hydraulic classifiers – magnetic separation – electrostatic separation – Froth flotation. **Types of conveyors: -** Belt conveyor – chain conveyor – Bucket elevators – Screw conveyors– Conveyor accessories – Pneumatic conveying – field of application.	**15 Hrs**
V	**GRAVITY SEDIMENTATION, FILTRATION, CENTRIFUGES AND DUST COLLECTOR** **Gravity sedimentation:** - Gravity sedimentation operation – principles of batch sedimentation –Kynch theory – Gravity thickener equipment operation. **Filtration: -** Principles – Types of filtration equipments – Rotary drum filter – horizontal pan filter – belt filter – their construction, operation and field of application. Filter medium, filter aids and their applications – Constant pressure and constant volume filtration – filter medium resistance and filter cake resistance – factors controlling them. **Centrifuges: -** Principles – classification of centrifuges – batch – continuous and semi-continuous types – centrifuges and their field of application – Sedimentation Centrifuge and Centrifugal filters. **Dust collectors: -** Gravity settler, Impingement separator, cyclone separators – Centrifugal separator – fabric filters and electrical precipitators – their principles of working and industrial applications.	**17 Hrs**

TEXTBOOKS:

1. Unit operations of Chemical Engineering by W.C.Mccabe & J. C. Smith, Mc Graw Hill Book co., 1995.

2. Introduction to Chemical Engineering by W.L. Badger & J.T. Banchero, McGraw Hill Book co., 1998.

REFERENCE BOOKS:

1. Perry's Chemical Engineering Hand Book by Robert H. Perry – Mc Graw Hill Book co.,

2. Principles of Unit Operations by A.S. Foust Etal –Wiley International Edition

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

RAW SUGAR MANUFACTURE

CURRICULUM DEVELOPMENT CENTRE

M – SCHEME
(Implements from the Academic year of 2016 – 2017 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject code : 37482
Semester : VI Semester
Subject Title : **RAW SUGAR MANUFACTURE**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15Weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
RAW SUGAR MANUFACTURE	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION:

UNIT	**TOPICS**	**TIME (hours)**
I	CANE QUALITY AND MILLING	15
II	HEATING AND SETTLING	15
III	FILTRATION AND EVAPORATION	15
IV	PAN BOILING AND CRYSTALLISATION	15
V	CENTRIFUGING, BAGGING AND STORAGE	15
Total		75

RATIONALE:

Now a days , shortage of sugar cane all over India and some countries, also due to that
crushing season is reduced and the management face financial problems for to give wages
to worker, purchase of raw materials and others factors hence, the management force to
increase the production , they go for raw sugar manufacture .

OBJECTIVES: -

On completion of the units of syllabus contents the students must be able to know About

- The student gets to know about how to clean the cane in field before sending to crushing .

- He know about what are the ingredients present in the cane and cane juice.
- He will also be able to know how the whole cane changes to small pieces with help of preparatory devices.
- The student know about how to separate the bagacillo from juice.
- The student know about, what is the necessity to heat the juice.
- Know about juice velocity in juice heater.
- He know about, what is scale, how it is formed.
- They know about, what is the main role of phosphate for juice settling.
- The student will also know about, why defecation process is good for raw sugar.
- He know about, what are the factors affect the filtration.
- The student know about how the mud mixer is working.
- He will also be able to know the composition of mud.
- How colour, pH, temperature affect the raw sugar quality when improper boiling.

- He know about, what are the ingredients present in the scale and how to remove.
- The student gets to know boiling principles for sugar crystal making.
- This unit also tells about reduce the sugar loss, when to follow proper boiling
- scheme.
- He comes to know about, what is the entrainment, how to prevent.
- This unit deal about massecuite cooling.
- The student know about double curing and its merits.
- He also know about how to operate the hopper, grader and elevator.
- This topic tells about proper temperature for sugar bagging.
- Students learn about how to stack the sugar bags in go down.
- This topic compares the different quality of raw sugar.

37482-RAW SUGAR MANUFACTURE
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CANE QUALITY AND MILLING** Cane – Harvest – free from tops – nitrogen compounds in tops – composition of cane – different constituents viz – wax, starch, gums, dextran, acids and colouring matters present in cane juice and theirrole in raw sugar manufacture. Cane crushing – preparatory devices, mills – working of a Four Mill Tandom – Imbibition – Hot water imbibition and cold water Imbibition – Advantages and disadvantages – mill speed – screening of raw juice - D.S.M. screen, strainers	**15 Hrs**
II	**HEATING AND SETTLING** Juice weighing scale - Juice heating – primary juice heating, secondary juice heating, juice velocity of heater, construction and working of vertical Juice Heater Scale – composition of juice heater scale – Removal of scale. Chemicals used for clarification – Quality of lime stone, construction and working of lime slaker, preparation of milk of lime – construction and operation of sulphur burner – Roll of phosphate in the manufacture of raw sugar – Defecation process – construction and working of sulphitation tank – Reaction tank juice pH – flash tank. Flash tank – settling aid – factors affecting settling – construction and working of 444 Rapi dorr – juice clarity.	**15 Hrs**
III	**FILTRATION AND EVAPORATION** Muddy juice – pH, cao content, factors affecting filteration, mud mixer, amount of bagacillo – Construction and operation of Rotary Vacuum Filter – cake – washing, moisture and pol % Filter cake. Evaporation – Rilleux's principles – object of evaporation, percentage of evaporation in a multiple effect evaporator – Quad system – vapour bleeding arrangements – colour, pH, temperature and brix of syrup – Entrainment and entrainment catcher – scale formation and removal.	**15 Hrs**

IV	**PAN BOILING AND CRYSTALLIZATION** Concentration of syrup – principles of pan boiling – Grain establishment method – True seeding method – merits – Three Massecuite boiling scheme – Flow diagram of three massecuite boiling scheme for Raw sugar – A massecuite boiling – B massecuite boiling and C massecuite boiling – Formation of false grain and conglomerates – their causes and effects – preventive method. Crystallisation – Factors affecting crystallization, growth of crystal, types of crystallizer, cooling followed, molasses exhaustibility - treatment of low grade massecuite in crystallizers.	**15 Hrs**
V	**CENTRIFUGING, BAGGING AND STORAGE** Curing – Double curing all 3 massecuite – merits and demerits of double curing – Hopper – sugar elevator – Grader for raw sugar. Bagging – ambient temperature – high temperature affect raw sugar colour and quality of raw sugar. Comparison of Three Types of raw sugar qualities. Storage: Belt conveyor transport – 50 kgs Bags for packing the raw sugar, Godown – away from spray pond – Raw sugar bags keeping in well constructed go down – Delivery – FIFO system.	**15Hrs**

REFERENCE BOOKS:

1. Cane sugar hand book By James C.P Chen, 2nd Edition.
2. Production of Quality Raw sugar by A.A Zende, (All India seminar on production of quality raw sugar)
3. Production of sulphur less sugar for Export-R.V. Dani (All India seminar on production of quality raw sugar)

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

SUGAR TECHNOLOGY PRACTICAL - III

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject Code : 37464
Semester : VI Semester
Subject Title : **SUGAR TECHNOLOGY PRACTICAL - III**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
SUGAR TECHNOLOGY LABORATORY - III	4	60	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

RATIONALE:

In Diploma level engineering education skill development plays a vital role. These can be achieved by experience in handling various equipments. This is accomplished by doing engineering related experiments in practical classes.

GUIDELINES:

All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..

The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS:

1. Determination of sulphitate ash content of the given sugar sample.
2. Determination of conductometric ash in sugar.
3. Determination of P_2O_5 in mixed juice.
4. Determination of T.R.S from juice.
5. Estimation of Cao in lime by phenol method.
6. Determination of ash percentage the given juice sample.
7. Estimation of Sucrose, by mansion and walkers method.
8. Find the setting rate/time the given juice sample by using “V” apparatus.
9. Determination of T.R.S from Gur Sample
10. Determine the brix of the juice present in cane by hand refracto meter.

STUDY EXPERIMENT

11.Find the cold nutch purity of given low grade massicute by using nutch apparatus

LIST OF EQUIPMENTS:

1. Hot Plate
2. Polarimeter
3. Weighing Scale
4. Hot Air Oven
5. Rapid Pol Extractor
6. Hand Refracto Meter
7. Sieve Mesh
8. Small Cane Crusher
9. Calorimeter
10. Muffle Furnace
11. Conductivity Meter

Model Question Paper

ALLOCATION OF MARKS:	
Aim and Procedure	10 Marks
Observation	15 Marks
tabulation	15 marks
Calculation	20 Marks
Result	10 Marks
Viva-Voice	05 Marks
Internal Assessment	25 Marks
Total	100 Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

BY PRODUCT AND QUALITY CONTROL PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject Code : 37465
Semester : VI Semester
Subject Title : **BY PRODUCT AND QUALITY CONTROL PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
BY PRODUCT AND QUALITY CONTROL LABORATORY	5	75	Internal Assessment 25	Board Examination 75	Total 100	3 Hrs

RATIONALE:

In Diploma level engineering education skill development plays a vital role. These
can be achieved by experience in handling various equipments. This is accomplished by
doing engineering related experiments in practical classes.

OBJECTIVES:

- After completion of this laboratory, the students will be able
- To understand how testing of Petroleum distillates (Gasoline, Kerosene, Lube oil) is
  done
- To know how distillates meet the specification to satisfy the end users requirement.
- The students will be aware of the tests carried in Refinery.
- To know the importance of Aniline point, Bromine number for Aromatics
- To understand about carbon residue which is more important for heavier ends for
  further cracking operation.

GUIDELINES:

All the Eight experiments given in the list of experiments should be completed and given for the end semester practical examination.

In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..

The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS:

1. Determination of Brix, Pol and apparent purity of molasse by dilution method.

2. Measurement of colour for molasses sample.

3. Estimation of reducing sugars from molasses potassium ferric cyanide method.

4. Analysis of bagasse.

5. Analysis of filter mud.

6. Determination of ash content from bagasse.

7. Estimation of T.R.S from molasses.

8. Find the ICUMSA value for the given sugar sample.

STUDY EXPERIMENT

9.Determination of purity of nutch the given molasses sample

Model Question Paper

ALLOCATION OF MARKS:	
Aim and Procedure	10 Marks
Observation	15 Marks
tabulation	15 marks
Calculation	20 Marks
Result	10 Marks
Viva-Voice	05 Marks
Internal Assessment	25 Marks
Total	100 Marks

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

COMPUTER APPLICATION IN SUGAR INDUSTRY PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : **Diploma in Sugar Technology (Full Time)**
Subject Code : 37466
Semester : VI Semester
Subject Title : **COMPUTER APPLICATION IN SUGAR INDUSTRY PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
COMPUTER APPLICATION IN SUGAR INDUSTRY LABORATORY	5	75	Internal Assessment 25	Board Examination 75	Total 100	3 Hrs

RATIONALE

In diploma level sugar technologies students know about computer skill to develop the our industries ability the various division of record analysis and manufacturing report to make excel spread sheet then draw a evaporator juice heater and rotary vacuum filter to make a design of AutoCAD

GUIDELINES:

- All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
  In order to develop best skills in handling Instruments/Equipment and taking reading in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory..
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitted a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS

1. Create the Daily Analysis record for Mixed Juice, Primary Juice, Last Expressed Juice, Last mill Juice, Clarified Juice.
2. Create the Daily Analysis record for all molasses.
3. Create the Daily Analysis record for sugars, special analysis, and pH record.
4. Create the Total average record for cane.
5. Create the Total average record for massecuite, and molasses.
6. Create the Total average record for fuel, Time, Account.
7. Create the Daily manufacturing report.
8. Draw the Rotary Vacuum filter using AutoCAD.
9. Draw the Evaporator using Auto cad.
10. Draw the Juice heater using Auto CAD.

BOARD EXAMINATION EVALUATION
Practical Examination

ALLOCATION OF MARKS

Content	Max. Marks
Writing steps	20
Execution of exercise	30
Result with Printout	20
Viva voce	5
Total	**75 Marks**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN SUGAR TECHNOLOGY

(III YEAR)

M-SCHEME

VI –SEMESTER

2015-2016 ON WORDS

PROJECT WORK

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : Diploma in Sugar Technology (FT)
Subject Code : 37467
Semester : VI
Subject Title : **PROJECT WORK**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROJECT WORK	4	60	25	75	100	3 Hrs

OBJECTIVES

- To develop the creative talents in the students.
- The project work should involve less cost, easy manufacturing technique and suitable to the real life situations.
- The project work should be useful to the mankind.
- To give the students a taste of real life problem solving and thus simulate industrial environment within the polytechnic.
- To develop those abilities that cannot be developed by normal class room situations such as group work, sharing responsibility, initiate, creativity etc.

Internal Assessment	Marks
Project Review I (8th Week)	10
Project Review II (14th Week)	10
Attendance	5
Total	25

NOTE:

- The selection of Project work should be carried out in V semester itself.
- The Project committee's approval should be obtained prior to the executing of project.
- Periodical assessment should be carried out from V semester.
- The students' batch size should not exceed 6 Nos.
- The students should maintain a logbook of the work carried out by them.
- The internal assessment marks will be given based on the work carried out by the students as per the logbook.

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics.
- Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management.
- Understand and gain knowledge about disaster management

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	65
Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e. 2 questions x 2 topics = 4 questions 4 questions x 2 ½ marks = 10 Marks	10
Total	**75**

DETAILED SYLLABUS

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services -

Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

LIST OF QUESTIONS

1. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term 'Environmental Waste Audit'.
14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
16. Describe any two methods of converting waste into energy.
17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.

22. Explain briefly the Physical treatments “Sedimentation” and “Floatation” processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source – Path – Receiver concept of Noise control.
43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

2. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.

3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings ? What are its requirements ?
20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?

26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants?

DIPLOMA IN SUGAR TECHNOLOGY (FULL TIME)
ALTERNATIVE SUBJECTS

Sem	Subject Code	L-SCHEME (Implementing academic year 2011-2012)	Subject Code	M-SCHEME (Implementing academic year 2015-2016)
III SEMESTER W.E.F OCT '16				
III	27431	Sugar Organic Chemistry	37431	Sugar Organic chemistry
III	27032	Mechanical Engineering*	37032	Mechanical Engineering*
III	27033	Electrical and Electronics Engineering*	37033	Electrical and Electronics Engineering*
III	27034	Mechanical Engineering Practical*	37034	Mechanical Engineering Practical*
III	27035	Electrical and Electronics Engineering Practical*	37035	Electrical and Electronics Engineering Practical*
III	27036	Work Shop Practice-II*	37036	Work Shop Practice-II*
III	20001	Computer application practical#.	30001	Computer application practical#.
IV SEMESTER W.E.F APR '17				
IV	27441	Chemical Process Industries	37441	Chemical Process Industries
IV	27042	Fluid Mechanics*	37042	Momentum transfer*
IV	27443	Sugar Cane Agriculture	37443	Sugar Cane Agriculture
IV	27044	Engineering Drawing*	37044	Engineering Drawing*
IV	27445	Sugar Technology Practical-I	37445	Sugar Technology Practical-I
IV	27046	Fluid Mechanics Practical*	37046	Momentum transfer Practical*
IV	27047	Technical Analysis Practical	37047	Technical Analysis Practical*
V SEMESTER W.E.F. OCT ' 17				
V	27051	Heat Transfer*	37051	Heat Transfer*
V	27452	Plantation White Sugar Manufacture	37452	Plantation White Sugar Manufacture
V	27053	Process Instrumentation and Control*	37053	Process Instrumentation and Control*
V	27471	**Elective – I** 1.Process Equipment Capacity	37471	**Elective – I** 1. 1.Process Equipment Capacity
	27472	2.By Product Corrosion In Sugar Industries	37472	2. By Product Corrosion In Sugar Industries
V	27055	Chemical Process Measurement and Control Practical*	37055	Chemical Process Measurement and Control Practical*
V	27456	Sugar Technology Practical-II	37456	Sugar Technology Practical-II
V	20002	Life and Employability Skill Practical#	30002	Life and Employability Skill Practical#
VI SEMESTER W.E.F APR '18				
VI	27561	Plant Engineering and Management	37561	Plant Engineering and Management
VI	27462	Milling And Chemical Control	37462	Milling And Chemical Control
VI	27481	**ELECTIVE-II** 1.Unit Operations	37481	**ELECTIVE-II** 1.Unit Operations
	27482	2.Raw Sugar Manufacture	37482	2.Raw Sugar Manufacture
VI	27464	Sugar technology practical -III	37464	Sugar technology practical -III
VI	27465	By Product And Quality Control Practical	37465	By Product And Quality Control Practical
VI	27466	Computer Application In Sugar Industry Practical	37466	Computer Application In Sugar Industries Practical
VI	27067	Project Work	37467	Project Work