

राष्ट्रीय शर्करा संस्थान
कानपुर

NATIONAL SUGAR INSTITUTE

KANPUR

आई.एस.ओ. 9001:2015 प्रमाणित संस्थान

AN ISO 9001:2015 CERTIFIED INSTITUTE



सत्यमेवजयते

विवरण पत्रिका

PROSPECTUS

2020

CONTENTS

SL. No	Index	Page No.
1.	Historical Background.	3
2.	Main Functions of the Institute	3
3.	Advisory Board	4
4.	Teaching staff of the Institute	5
5.	Detail of Courses	8
6.	Tuition and Other Fees	12
7.	Scholarships and Awards	14
8.	Instructions to Candidates and Entrance Exam Schedule	16
9.	Guidelines for Filling the Application Form	17
10.	Syllabus for Entrance Examination - A.N.S.I. (Sugar Tech.) Course	19
11.	Syllabus for Entrance Examination - A.N.S.I. (Sugar Engg.) Course	22
12.	Syllabus for Entrance Examination - D.I.F.A.T Course	24
13.	Syllabus for Entrance Examination - D.S.P.M.M. Course	28
14.	Syllabus for Entrance Examination -D.I.I.P.A. Course	30
15.	Syllabus for Entrance Examination -D.Q.C.E.S. Course	31
16.	Syllabus for Entrance Examination - S.E.C.C. Course	34
17.	Syllabus for Entrance Examination - S.B.C.C Course	35
18.	Syllabus for Entrance Examination - C.C. Q.C. Course	36

NATIONAL SUGAR INSTITUTE

KANPUR

1. HISTORICAL BACKGROUND

It was the Indian Sugar Committee appointed by Government of India in 1920 that first recommended the establishment of an all India Institute for research in Sugar Technology. The need for a Central Sugar Research Institute was also emphasized by the Royal Commission on Agriculture in 1928 and the Tariff-Board in 1930. The Government of India accordingly established the Imperial Institute of Sugar Technology at Kanpur in October, 1936 by taking over the Sugar Section of Harcourt Butler Technological Institute (H.B.T.I.), Kanpur. The Imperial Institute of Sugar Technology was placed under the administrative control of the Imperial Council of Agricultural Research but continued to be housed in the building of H.B.T.I. With the formation of Indian Central Sugarcane Committee in 1944, the administrative control of the Imperial Institute of Sugar Technology was transferred to that Committee. Consequent on India's attaining independence; the name of the Institute was changed to Indian Institute of Sugar Technology (I.I.S.T.). With the formation of the Development Council for Sugar Industry under the provisions of the Industries (Development and Regulation) Act 1951, the functions of the Indian Central Sugarcane Committee were abridged and with effect from 1st January, 1954, the administrative control of the Institute was transferred to the Government of India, under the then Ministry of Food & Agriculture. In April, 1957, the name of the Institute was again changed to National Sugar Institute (N.S.I.). The Institute shifted from H.B.T.I., to its present premises in 1963.

2. MAIN FUNCTIONS OF THE INSTITUTE:-

The main functions of the Institute are as follows:-

- (i) To provide technical education and training in all branches of sugar chemistry, sugar technology, sugar engineering and allied fields;
- (ii) To undertake research on:-
 - (a) Problems pertaining to sugar technology, sugar and sugarcane chemistry and sugar engineering in general and those of sugar factories in particular; and
 - (b) Utilization of by-products of sugar industry; and
- (iii) To give technical advice and assistance to sugar factories with a view to improving their efficiency and to assist and guide them in their day-to-day problems. Assistance is also provided to Central and state Governments in matters relating to sugar and allied industries.

All these functions are carried out in an integrated manner, each one helping and influencing the other. The advisory and extension services bring the problems of the industry for research at the Institute. The research requires keeping abreast with modern developments and recent advances in science and technology. The close and continuing liaison between the Institute and the industry and the day-to-day knowledge gained through research give a practical base to the teaching and keep it up-to-date. These three functions- teaching, research and advisory make the Institute a unique one in the world.

3. ADVISORY BOARD

The activities of the Institute are guided by an Advisory Board set up by the Ministry of Consumer Affairs, Food & Public Distribution, Department of Food & Public Distribution, and Government of India. The composition of the Board (constituted on 15 February 2019) is as follows:-

1.	The Joint Secretary (Sugar & Sugar Admn.), Ministry of Consumer Affairs, Food and Public Distribution, Department of Food and Public Distribution, Krishi Bhawan, New Delhi.	Chairman
2.	The Deputy Secretary (Sugar Administration), Ministry of Consumer Affairs, Food and Public Distribution, Department of Food and Public Distribution, Krishi Bhawan, New Delhi.	Member
3.	The Director (Sugar and Vegetable Oils) Ministry of Consumer Affairs, Food and Public Distribution, Department of Food and Public Distribution, Krishi Bhawan, New Delhi.	Member
4.	The Professor & Head of Chemical Engineering Department, Indian Institute of Technology, GT Road, Kalyanpur, Kanpur	Member
5.	The Director Indian Institute of Sugarcane Research Institute, Dilkusha, Lucknow.(U.P.)	Member
6.	The President or his representative, Sugar Technologist Association of India, Okhla Plaza, New Delhi	Member
7.	The President or his representative, Indian Sugar Mills Association, Ansal Plaza, August Kranti Marg, New Delhi	Member
8.	The President or his representative, National Federation, of Co-operative Sugar Factories Ltd Ansal Plaza, August Kranti Marg, New Delhi	Member
9.	The President or his representative, All India Distilleries Association, Nehru Place, New Delhi	Member
10.	The Director General, National Test house, Ministry of Consumer Affairs, Food and Public Distribution, Department of Consumer Affairs, Salt lake city, Kolkata.	Member

11.	The Managing Director U P Coop. Sugar Factories Federation Ltd., Rana Pratap Marg, Lucknow,U.P.	
12.	The Director, U.P. Council of Sugarcane Research, Gandhiganj, Shahjahanpur, U.P.	Member
13.	The Director, Sugarcane Breeding Institute, Coimbatore, Tamilnadu .	Member
14.	The Vice Chancellor C S A University of Agriculture & Technology, Nawabganj ,Kanpur.	Member
15.	The Director, National Sugar Institute, Kalyanpur ,Kanpur 208017.	Member Secretary

The advisory board reviews the progress of work in different fields of activities of the Institute.

4. TEACHING STAFF OF THE INSTITUTE

The teaching staffs of the institute (not in order of seniority) (as on 01-02-2020) are as under:-

Shri Narendra Mohan, B.Sc., A.N.S.I. (Sugar Technology) F.N.S.I. (Sugar Technology)		DIRECTOR
SUGAR TECHNOLOGY		
1.	Dr. Ashutosh Bajpai M.Sc., Ph.D., A.N.S.I. (Sugar Technology)	Prof. of Sugar Technology
2.	Dr. Jahar Singh M.Sc., Ph.D., A.N.S.I. (Sugar Technology)	Asstt. Prof. of Sugar Technology
3.	Shri Jitendra Singh M.Sc., A.N.S.I. (Sugar Technology)	Asstt. Prof. of Sugar Technology
4.	Shri S.K. Trivedi B.Sc., A.N.S.I., F.N.S.I (Sugar Technology)	Asstt. Prof. of Sugar Technology
5.	Shri A.K. Garg B.Sc., A.N.S.I. (Sugar Technology)	Asstt. Prof. of Sugar Technology
6.	Shri Mihir Mandal M.Sc., A.N.S.I. (Sugar Technology)	Asstt. Prof. of Sugar Technology
7.	Shri Mool Chandra B.Sc., A.N.S.I.(Sugar Technology)	Junior Technical Officer(Sugar Technology)
8.	Shri Ajay Kumar Awasthi B.Sc., A.N.S.I. (Sugar Technology)	Junior Technical Officer(Sugar Technology)
9.	Shri Vivek Pratap Singh B.Sc., A.N.S.I. (Sugar Technology), FNSI (ST)	Junior Technical Officer(Sugar Technology)
10.	Shri A.K. Asthana M.Sc., A.N.S.I. (Sugar Technology)	Junior Technical Officer(Sugar Technology)
11.	Shri Mahendra Kumar Yadav B.Sc., A.N.S.I. (Sugar Technology)	Junior Technical Office(Sugar Technology)r
12.	Shri Ashish Kumar Shukla B.Sc., A.N.S.I. (Sugar Technology), FNSI (ST),MBA	Junior Technical Officer(Sugar Technology)

13.	Shri Subhash Chandra M.Sc., A.N.S.I. (Sugar Technology)	Junior Technical Officer (Sugar Technology)
14.	Shri Prem Shankar Katiyar B.Sc., A.N.S.I. (Sugar Technology) P.G. Diploma in Computer Programming.	Senior Technical Assistant (Sugar Technology)
15.	Shri Vaibhav Sharma B.Sc., A.N.S.I. (Sugar Technology)	Senior Technical Assistant (Sugar Technology)
16.	Shri Mahendra Pratap Singh M.Sc., ANSI (Sugar Technology), MBA (HR)	Senior Technical Assistant (Sugar Technology)
17.	Shri Amresh Pratap Singh B.Sc., A.N.S.I. (Sugar Technology)	Senior Technical Assistant (Sugar Technology)
18.	Shri Mohit Kumar B.Sc., A.N.S.I. (Sugar Technology)	Senior Technical Assistant (Sugar Technology)
19.	Shri Tej Pal Verma B.Sc., A.N.S.I. (Sugar Technology)	Senior Technical Assistant (Sugar Technology)
20.	Shri Ashish Kumar B.Sc., A.N.S.I. (Sugar Technology)	Senior Technical Assistant (Sugar Technology)
21.	Shri Anurag Kumar Verma B.Sc., A.N.S.I. (Sugar Technology)	Technical Assistant(Sugar Technology)
SUGAR ENGINEERING		
1.	Shri Doctor Swain, AM.I.E. (Mech. Engg.) A.N.S.I.(Sugar Engg.) M. Tech.(Mech.Engg.)	Prof. of Sugar Engineering
2.	Shri Anoop Kumar Kanaujia, B.Tech (Elect. Engg.), M.Tech (Elect. Engg.)	Assistant Professor of Sugar Engineering
3.	Shri Sanjay Chauhan B.Sc. Engg.(Mech.) BOI, ANSI(Sugar Engg)	Assistant Professor of Sugar Engineering
4.	Shri Vinay Kumar AMIE (Elect. Engg.) M.Tech	Assistant Professor of Sugar Engineering
5.	Shri Kuldeep Singh Rana M.Tech(Mfg.)	Asstt. Engineer (Elect.)
6.	Shri Ashutosh Pratap Singh M.Tech.	Senior Research Assistant (Engg.)
7.	Shri Nilesh Kumar Verma Polytechnic Diploma(Mech. Engg.)	Research Assistant (Engg.)
INSTRUMENTATION ENGINEERING		
1	ShriVirendra Kumar B.Tech (Electronics & Instrumentation)	Senior Instrumentation Engineer
2	Shri Brajesh Singh B.Tech (Applied Electronics & Instrumentation)	Technical Officer (Instrumentation)
DESIGN & DEVELOPMENT		
1	Shri Akhilesh Kumar Pandey Intermediate, ITI	Chief Designer

2	Shri Shashi PrakashYadav Diploma in Mech. Engg.	Senior Draughtsman
ORGANIC CHEMISTRY		
1	DR. Vishnu Prabhakar Srivastava M.Sc., Doctorate (D.Phil.)	Asstt. Prof. of Organic Chemistry
2	Dr. (Mrs.) Chitra Yadav M.Sc., Ph.D.	Research Assistant (Organic Chemistry)
PHYSICAL CHEMISTRY		
1	Dr. Sudhanshu Mohan M.Sc., Ph.D.	Junior Scientific Officer (Physical Chemistry)
AGRICULTURE CHEMISTRY		
1	Dr. Ashok Kumar M.Sc. (Ag.), Ph.D. (Soil Science & Agri .Chem.)	Assistant Professor of Agriculture Chemistry
2	Dr. Lokesh Babar M.Sc. (Agri. Chem.), Ph.D.(Agri. Chem.)	Junior Scientific Officer (Agri.)
BIOCHEMISTRY		
1	Dr. (Mrs) SeemaParoha, M.Sc., Ph.D.	Professor of Bio Chemistry
2	Shri Dinesh Chandra M.Sc.	Research Assistant(Bio-Chemistry)
3	Dr.(Mrs) Alka Gupta M.Sc., Ph.D.	Laboratory Assistant

5. DETAIL OF COURSES

The Institute provides facilities for training the students in Sugar Technology, Sugar Engineering, Industrial Fermentation and Alcohol Technology, etc.

For all Courses;-

AGE LIMIT: - For Indian candidates: 35 years (Maximum) as on 01.07.2020.Candidates born on or after 01.07.1984 only will be considered.

For Foreign Category Candidates: 38 years (Maximum) as on 01.07.2020.Candidates born on or after 01.07.1981 only will be considered.

Academic year-From 1st July to 31st May.

The details of the courses of study are given below:-

5.1 POST GRADUATE DIPLOMA COURSES

Course	Duration	Minimum Qualification		No. of Seats									Scope
		Academic (All educational qualifications should be from recognized Institute/School/College/ Polytechnic/University).	Experience	Vertical Reservation					Total	Horizontal Reservation			
				General	Scheduled Castes (15%)	Scheduled Tribes (7.50%)	OBC (27%)	EWS (10%)		Rural (15%)	Defence(5%)	Physically challenged (3%)	
ANSI (ST) Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Technology	Two and half academic years	B.Sc. with Chemistry, Physics and Mathematics or Bachelors Degree in Chemical Engineering.	----	30	09	05	16	06	66	09	03	02	Diploma holders of this course are usually appointed to the posts of Manufacturing Chemist, Lab In charge and Assistant Manager (Process) etc. in Sugar and allied Units
ANSI (SE) Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Engineering	One and Half academic Years	Bachelor's Degree or A.M.I.E.(from The Institutions of Engineers, India) in Mechanical/ Production/ Electrical/ Electrical & Electronic.	-----	15	05	02	08	03	33	05	02	01	Diploma holders of this course are usually appointed to the posts of Engineer, Assistant Engineer and Assistant Manager (Engg) etc in Sugar and allied Industries.

DIFAT Post Graduate Diploma Course in Industrial Fermentation and Alcohol Technology	One and Half academic Years	B.Sc. with Chemistry / Applied Chem./ Industrial Chem. or Bio- Chemistry as one of the subject. or B. Tech. in Bio- Technology / Chemical Engineering or Bio Chemical Engineering.	----	18	05	03	09	04	39	05	02	01	Diploma holders of this course are usually appointed to the posts of Distillery Chemist & Supervisory Chemist, etc. in distilleries, breweries & other fermentation Units.
DSPMM Post Graduate Diploma Course in Sugarcane Productivity and Maturity Management	One academic Year	B.Sc. / B.Sc. Agriculture	----	09	03	01	05	02	20	03	01	01	The Diploma holders shall get chance for appointment to the posts of Cane Development Officer, Cane Officer & Cane Supervisor etc in sugar factories and cane departments
DIIPA Post Graduate Diploma Course in Industrial Instrumentation & Process Automation	One academic Year	Bachelor's Degree or A.M.I.E.(from The Institutions of Engineers, India) in Electronics & Instrumentation / Electronics /Instrumentation / Electrical & Electronics/Applied Electronics & Instrumentation / Electronics & Communication / Instrumentation & Control	----	08	02	01	04	02	17	02	01	01	Diploma holders of this course shall get chance for appointment to the posts of Assistant Engineer (Inst.). Or Instrument Engineer etc in Sugar and allied Industries.
DQCES Post Graduate Diploma Course in Quality Control And Environmental Science	One academic Year	B.Sc. with Physics, Chemistry, Maths or Zoology, Botany, Chemistry / B.Sc. with Environmental Science/B.Sc. (Bio- Technology) / B.Tech. (Bio- Technology).	----	10	03	02	05	02	22	03	01	01	The Diploma holders shall get chance for appointment as Environmental Chemist, Quality Control Chemist and Laboratory Chemist etc in Sugar Factory and Distilleries.

5.2 CERTIFICATE COURSES.

SECC Sugar Engineering Certificate Course	One and Half academic Years	Diploma in Mechanical/ Production/ Electrical/ Electrical & Electronic from a recognized Technical School/Polytechnic.	-----	08	02	01	04	02	17	02	01	01	The certificate holders are usually appointed to the posts of Junior Engineer and Assistant Engineer etc. in sugar and allied Industries.
SBCC Sugar Boiling Certificate Course	One academic Year	Matriculate/ High School with Science/Agriculture.	One season experience (of minimum 90 days) of pan-operation in a vacuum pan sugar Factory along with Nomination.	29	09	04	15	06	63	09	03	02	The certificate holders are usually appointed to the posts of Panman, Head Panman, and Laboratory Chemist, etc. in sugar factories.
CCQC Certificate Course in Quality Control	Four months (July to October)	12 standard in Science (Physics, Chemistry and Mathematics)	----	10	03	02	05	02	22	03	01	01	The certificate holders are appointed to the posts of Laboratory Chemist, Quality Control Chemist and Laboratory In-charge etc in sugar and allied Industries.
Total				137	41	21	71	29	299	41	15	11	

5.3 Fellowship Diploma of the Institute (F.N.S.I.)

(a) **Age limit: - 50 years (Maximum) as on 01.07.2020**

(b) **Qualifications for admissions:-**

<u>Diploma</u>	<u>Admission Qualifications</u>
(i) F.N.S.I. in Sugar Technology or Sugar Chemistry	A.N.S.I. (Sugar Tech.)
(ii) F.N.S.I. in Sugar Engineering	A.N.S.I. (Sugar Engg.)
(iii) F.N.S.I. in Fermentation Technology	D.I.F.A.T.

Application for F.N.S.I. in Sugar Technology & Sugar Engineering should be sponsored by a sugar factory/allied unit for carrying out the research pertaining to this course. Similarly, application for F.N.S.I. in Fermentation Technology should be sponsored by a distillery or brewery industry or allied unit for carrying out the research work pertaining to this course.

Un-sponsored applications would be rejected-

(a) **Duration of the Course –**

For (i) & (ii) – One year or three off-seasons of four months each followed or preceded by practical training for two cane crushing seasons in a sugar factory. The research work may be carried out at the factory/unit under the supervision of guide.

For (iii)- One year followed or preceded by practical training of one year in a distillery or brewery.

(c) **Rules and regulations for admission to F.N.S.I. -**

1. The fellowship Diploma can be obtained by research work under the guidance of the research staff of the Institute on problems which have bearing on sugar technology, sugar chemistry, sugar engineering and fermentation technology.
2. Intending candidates may be required to appear for an interview before Selection Committee who will satisfy themselves that a particular candidate is fit for admission to this course.
3. After the student has been admitted to this course, he will be required to prepare an outline of the problem which he proposes to take up for investigation and submit it to the Director for approval.
4. Each student of F.N.S.I. (Sugar Tech, Sugar Chemistry and Sugar Engg.) will be required to work in a sugar factory/allied unit during two cane seasons; in case of F.N.S.I. (Fermentation Technology) student will be required to work in any distillery/ allied unit for one year but no student except a nominee of a factory will be permitted to take up a salaried appointment or engage himself in private practice during the course of study.
5. Each candidate will have to submit three typed copies of his/her thesis embodying the result of his/her investigation not later than 15th November or 15th May, as the case may be, or any subsequent date which the Director may fix. The thesis will be examined by a Board of Examiners of whom one will be the officer under whom the work has been carried out and the other an external examiner, who will be appointed by the Director. After the evaluation of thesis, the Board of Examiners will conduct a viva-voce examination and make their final recommendation to the Director regarding the award of the Diploma. If a student fails to qualify for the Diploma once, he may be allowed to continue his/her work at the Institute for one or more sessions and submit a fresh thesis.
6. The thesis submitted by a candidate will be the property of the Institute and shall not be published without the permission of the Director. Publication of thesis without the permission of the Director will disqualify a student altogether for the Diploma with the same thesis.
7. An assistant working in the Institute is considered to be a student for the award of a fellowship diploma provided he/she is either an associate of the Institute or possesses an equivalent qualification. He/ She can after three years of service in the Institute submit a thesis containing his/her research work which shall be considered along with the other candidate admitted to the fellowship course. The work submitted should have been carried out by him/her either independently or under the direction of research officer of the Institute. He shall be required to intimate the Director at least six months before the date of submission of thesis. He/She will be required to deposit a fee of Rs. 500

6. TUITION AND OTHER FEES

6.1 The following are the tuition fees for the various courses:-

Sl. No.	Courses	Per month (Rs.) For		
		Other than SC/ST and candidates	S.C /S.T Candidates	Foreign Nationals / PIO's candidates
1.	Fellowship of National Sugar Institute	2200	1400	-----
2.	Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Technology	2200	1400	9000
3.	Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Engineering	2200	1400	9000
4.	Post Graduate Diploma Course of in Industrial Fermentation and Alcohol Technology	2200	1400	9000
5.	Post Graduate Diploma Course in Sugarcane Productivity and Maturity Management	2200	1400	9000
6.	Post Graduate Diploma Course in Industrial Instrumentation & Process Automation	2200	1400	9000
7.	Post Graduate Diploma Course in Quality Control And Environmental Science	2200	1400	9000
8.	Sugar Engineering Certificate Course	1600	1000	7500
9.	Sugar Boiling Certificate Course	1600	1000	7500
10.	Certificate Course in Quality Control	1600	1000	7500

6.2 In addition to the above monthly tuition fees, the students will have to pay, at the time of admission, following fees and deposits as detailed below:-

S.No	Item	Fee (Rs.)
1	Caution Money deposit (Refundable)	1000
2	Annual Subscription for Scientific Society	800
3	Annual Games fees	800
4	Annual Subscription for Cultural Society	800
5	Examination Fees- per session for all courses	800
6	Common Room fees per year(For Diploma Courses)	1200
7	Common Room fees per year(For Certificate Courses)	600
8	Alumni fees	400
9	Hostel fees:	
	a. Hostel Admission fees	400
	b. Room rent per month: (Single Occupancy) For Foreigner	1000
	c. Room rent per month: (Double Occupancy) For Foreigner	600
	d. Room rent per month: (Single Occupancy) For Indian	600
	e. Room rent per month: (Double Occupancy) For Indian	400
	f. Electricity & water charges per month Single Occupancy	350
	g. Electricity & water charges per month Double Occupancy	250
	h. Hostel caution money (Refundable)	1000
	i. Hostel crockery fee per term (half-yearly)	500
	j. Medical fees half-yearly	300
	k. Hostel mess advance per month	2800
	l. Hostel Establishment	
	• ANSI(ST- I yr) & DSPMM	2500
	• Others	2000
10	Convocation fees	1000
11	Identity Cards Fees	100

Note:-

1. The students will have to pay fees etc. as given in 6.1 & 6.2 in advance for each year.
2. In case any student discontinues his studies after deposition of scheduled fees, only caution money deposit and hostel caution money are refundable

6.3 The total amount payable by the students of the different courses would be as follows:-

Sl. NO	Courses	Total amount payable (Rs.)			
		Terms/ Period	Other than SC/ST and candidates	S.C /S.T candidates	Foreign Nationals / PIO's / candidates
1.	Fellowship Diploma of the Institute (F.N.S.I.)	First Term	46800	42000	
		Second Term	42100	37300	
		Third Term	42100	37300	
2.	Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Technology [A.N.S.I.(ST)]	First Year	81000	71400	167400
		Second Year	65400	55800	151800
		Third Year	40100	35300	83300
3.	Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Engineering [A.N.S.I.(SE)]	First Year	68800	59200	155200
		Second Year	40100	35300	83300
4.	Post Graduate Diploma Course of in Industrial Fermentation and Alcohol Technology (DIFAT)	First Year	66000	56400	152400
		Second Year	40100	35300	83300
5.	Post Graduate Diploma Course in Sugarcane Productivity and Maturity Management (DSPMM)	Full Period	81000	71400	167400
6.	Post Graduate Diploma Course in Industrial Instrumentation & Process Automation (DIIPA)	Full Period	68500	58900	154900
7.	Post Graduate Diploma Course in Quality Control And Environmental Science (DQCES)	Full Period	68500	58900	154900
8.	Sugar Engineering Certificate Course (SECC)	First Year	69100	61900	142300
		Second Year	34100	30500	70700
9.	Sugar Boiling Certificate Course (SBCC)	Full Period	46950	39750	118750
10.	Certificate Course in Quality Control(CCQC)	Full Period	30700	28300	55100

NOTE: - ABOVE COURSE FEES ARE SUBJECT TO REVISION

7. SCHOLARSHIPS AND AWARDS

Scholarships and awards are available for different courses of study as listed below:-

7.1 For Students of Associateship course in Sugar Technology [A.N.S.I. (S.T.)]

Sl.No	Donor	No of Scholarship /Awards	Value	Basis of award	
				Position	Exam.
1.	Government of India, Ministry of Consumer Affairs, Food & Public Distribution.	1	Rs. 150 per Month	1 st in the order of merit	First year
2.	Government of India, Ministry of Consumer Affairs, Food & Public Distribution.	1	Rs. 100 per Month	2 nd in the order of merit	First year
3.	Indian Sugar Mills Association New Delhi.	1	Rs. 14000 in lump sum	1 st in the order of merit	First year
4.	Indian Sugar Mills Association New Delhi.	1	Rs. 7000 in lump sum	2 nd in the order of merit	First year
5.	National Federation of Co-operative Sugar Factories New Delhi	1	Rs. 3000 in lump sum	1 st in the order of merit	Final year
6.	National Sugar Institute Kanpur	1	Mahatma Gandhi Memorial Gold Medal	1 st in the order of merit	Final year
7.	Late (Shri) S.N.GunduRao Memorial Scholarship	1	Rs. 150 per Month	1 st in the order of merit	First year
8.	Late (Dr.) Kripa Shankar Memorial Scholarship	1	Rs. 300 per Month	Highest marks in Sugar Tech.	First year
9.	Shree Ji Future Leader Award by Shree Ji Process Engg. Works Ltd., Mumbai	1	Rs. 10000 and Trophy	a. Outstanding academic performance b. Participated Enthusiastically in various extra curriculum activity	First year
10.	ISGEC Sugar Technology Excellency Award by ISGEC Noida	1	Gold Medal	1 st in the order of merit	Final year
11.	Shri C.V. Subba Rao Excellence Award	1	Gold Medal & Rs. 10000	1 st in the order of merit	Final year

7.2 For Students of Associateship Course in Sugar Engineering [A.N.S.I. (S.E.)]

Sl.No	Donor	No of Scholarship /Awards	Value	Basis of award	
				Position	Exam.
1.	Government of India, Ministry of Consumer Affairs, Food & Public Distribution.	4	Rs. 300 per Month	In the order of merit from the selection test	-
2.	Indian Sugar Mills Association New Delhi.	1	Rs. 11000 in lump sum	1 st in the order of merit	First year
3.	Indian Sugar Mills Association New Delhi.	1	Rs. 6000 in lump sum	2 nd in the order of merit	First year

4.	Shree Ji Future Leader Award by Shree Ji Process Engg. Works Ltd., Mumbai	1	Rs. 10000 and Trophy	a. Outstanding academic performance b. Participated Enthusiastically in various extra curriculum activity	First year
5.	ISGEC Sugar Engineering Excellency Award by ISGEC Noida	1	Gold Medal	1 st in the order of merit	Final year

7.3 For Students of Diploma in Industrial Fermentation & Alcohol Technology [D.I.F.A.T.]

SL.No	Donor	No of Scholarship /Awards	Value	Basis of award	
				Position	Exam.
1.	Indian Sugar Mills Association New Delhi.	1	Rs. 10000 in lump sum	1 st in the order of merit	Final Year
2.	Praj Excellence Award by Praj Industries Ltd. Noida	1	Rs. 10000 in lump sum	1 st in the order of merit	Final Year
3.	ISGEC Alcohol Technology Excellency Award by ISGEC Noida	1	Gold Medal	1 st in the order of merit	Final year

7.4 For Students of SECC, SBCC & CCQC

1.	Late Smt Bhagwata Devi Memorial Scholarship	1	Rs. 600 per Month	1 st in the order of merit	First year (SECC)
2.	Late Smt Bhagwata Devi Memorial Scholarship	1	Rs. 600 per Month	1 st in the order of merit	Final year (SBCC)
3	Global Cane Sugar Services Award	1	Rs. 10000 in lump sum	1 st in the order of merit	CCQC, SBCC & SECC (final year)

7.5 General Rules applicable to all Scholarships:—

- (a) All scholarships are subject to filling a bond by the candidates so as to ensure that the purpose for which the scholarship is granted is fulfilled, failing which the money received is required to be refunded.
- (b) The scholarship is paid subject to satisfactory progress having been made and attendance being regular.
- (c) The scholarship is paid from the date on which the scholar actually joins the institute or from any other subsequent date from which the scholarship is payable after the commencement of the session. It is ordinarily tenable for the full period of the academic session.
- (d) A student cannot be recipient of more than one scholarship at a time.
- (e) Scholarships are subject to cancellation at any time in the event of any misconduct or irregularity on the part of the scholar.
- (f) If the number of students eligible for a particular category of Scholarship/Award exceeds the available number of Scholarship/Award of that category, the amount of Scholarship/Award will be equally distributed among the students eligible for Scholarship/Award. Those who are already in employment will not be entitled for any scholarship.

8. INSTRUCTIONS TO CANDIDATES & ENTRANCE EXAM. SCHEDULE

8.1 General Instructions:-

1. All rights for change of rules & regulations, Institute fees including number of seats etc., provided in this prospectus are reserved with the Institute and these can be changed any time without giving any notice or making any correspondence in this regard with anyone. In case of doubts or discrepancy the content of the English version of the prospectus shall be treated as final.
2. Before applying for admission, candidates should ensure that they possess the minimum qualifications required for the courses and if they are applying for a particular category they possess the proper certificates for that category complete in every respect as per the desired norms failing which their admission is liable to be cancelled.
3. Only one application form will be accepted from an applicant & for one course only.
4. Canvassing in any form will disqualify the candidate; hence no recommendations should be forwarded to the Director or any other Officer of the Institute.
5. All candidates will have to make their own arrangements of boarding and lodging for written test or interview and no T.A. etc. is admissible.
6. Candidates are required to bring all original certificates/degrees /diplomas and testimonials at the time of interview / counseling for admission.
7. Hostel is compulsory for students and they will essentially have to reside in hostel. However, in extreme circumstances, relaxation may be provided by the Director.

8. IMPORTANT INSTRUCTIONS TO FOREIGN CATEGORY CANDIDATES;

- a. For admission of Foreign Nationals / PIO's / Children of Indian workers in the gulf countries, in the A.N.S.I. (S.T.), A.N.S.I. (S.E.) and D.I.F.A.T. courses, 15 % seats shall be allowed on supernumerary basis. Eligibility criterion of age and qualification etc., as specified in the prospectus for various courses shall apply to these candidates also. The knowledge of written and spoken English is a must for foreign candidates
 - b. Candidates under foreign category quota shall have to submit the application on line only. The hard copy follow
 - c. The candidate has to submit details of his passport (a scanned copy) with the application form
 - d. The candidate, if employed , shall submit a "No Objection Certificate" from his employer for undertaking the studies.
9. **RULES FOR ATTENDANCE AND LEAVE**

- a. A student is required to put in a minimum of 75 percent attendance during each session in each subject. Non-compliance of this rule will render him liable to be debarred from appearing at the Diploma Examination.
- b. Ordinarily, leave for 15 days is admissible to a student in an academic year.
- c. Application of leave for absence must be handed over at the Education Section on the prescribed form.
- d. Application for leave must be counter signed by the Hostel Warden or the approved guardian.
- e. Application for Sick leave must be accompanied by a certificate from the Medical Officer of the Hostel.
- f. Absence without leave by a student drawing a scholarship may result in the cancellation or reduction of his scholarship.

8.2 For Candidates of A.N.S.I. (S.T.) , A.N.S.I. (S.E.), D.I.F.A.T., D.S.P.M.M. , D.I.I.P.A., D.Q.C.E.S., S.E.C.C., S.B.C.C., & C.C.Q.C. Courses

- (i) The candidates who have appeared in the Final examination of minimum prescribed qualification for A.N.S.I.(S.T.) , A.N.S.I. (S.E.), D.I.F.A.T., D.S.P.M.M., D.I.I.P.A., D.Q.C.E.S., S.E.C.C., & C.C.Q.C. Courses can also apply for admission.
- (ii) However they are required to provide the self attested copy of the original mark sheet or Internet Mark Sheet duly verified by the University of the Final Examination Result at the time of counseling failing which they will not be admitted and no relaxation is possible to be given on this account. But they are required to submit, self attested copies of rest of the mark sheets (each year/semester of B.Sc./B.E./ Diploma) along with application form.
- (iii) The entrance examination for admission to A.N.S.I. (S.T.), A.N.S.I. (S.E.), D.I.F.A.T., D.S.P.M.M. D.I.I.P.A., D.Q.C.E.S., S.E.C.C., S.B.C.C.,& C.C.Q.C., courses will be conducted in **June 2020 as per programme given below.**

Entrance Exam Schedule:-

(a) ANSI (ST) , DIIPA ,CCQC , SECC

DATE	TIME	SUBJECT
14.06.2020	09:00 AM. To 12:00 NOON.	As per syllabus given in Prospectus

(b) ANSI (SE) , DIFAT, DSPMM, DQCES, SBCC

DATE	TIME	SUBJECT
14.06.2020	02:00 PM. To 05:00 PM.	As per syllabus given in Prospectus

- (iv) Question papers for the admission test will be bilingual i.e. both in Hindi and English. Candidates will have the option to answer the questions in either of the language.
- (v) For counselling, provisionally selected and wait listed candidates will be informed on our web site <http://nsi.gov.in> . They can see the result of selection on the website of the Institute.
- (vi) Candidates already employed in the Sugar Industry will not be allowed to work in their factory during the First Year of A.N.S.I. (S.T.)
- (vii) Application form for S.B.C.C course should be accompanied by the nomination form duly completed and signed by competent authority under his seal, as mentioned in the prescribed form.
- (viii) Applicants are advised not to give any undertaking to the nominating factory in the matter of training or employment as during their tenure at the Institute they will be guided by the rules, regulations and arrangement made by the Institute.
- (ix) Mobile Phone, Pager or any such electronic device is not allowed inside Examination Hall.

9. GUIDELINES FOR FILLING THE APPLICATION FORM:

- (a) 1st step: - Eligibility Checking Online (Student Registration Number Generated)
2nd step: - Application form fill-up online. After successful submission, candidate will receive computer generated filled in application form in pdf format. (One office copy & other student copy)
- (b) The office copy of the application form generated from NSI website should be submitted to **Director, National Sugar Institute, Kanpur** along with the following documents:-
 - (i) Self-attested Pass port size Photograph pasted on plain paper

- (ii) Self-Attested copy of the certificate as proof for **Date of birth.**
- (iii) Demand draft towards the application fees (not required for foreign category candidate).
- (iv) Self-Attested copies of the mark sheets. [**For each Year / Semester of B.Sc./B.E., etc.**]
- (v) Original copy of the **Nomination Form** generated from NSI website by on line application at the time of submission of form. [**Compulsory for SBCC only**]
- (vi) For **S.C./S.T. category** candidates, Self-attested copy of certificate from appropriate authority in the rank of D.M./Collector/S.D.M./Tehsildar, with legible seal should be submitted.
- (vii) For **OBC (NCL) category** candidates, self-attested copy of certificate from appropriate authority in the rank of D.M./Collector/S.D.M./Tehsildar, with legible seal should be submitted. The Certificate should be issued after **31.03.2019.**
- (viii) For **EWS category** candidates, self-attested copy of certificate from appropriate authority in the rank of D.M./Collector/S.D.M./Tehsildar, with legible seal should be submitted. The Certificate should be issued after **31.03.2019.**
- (ix) For candidates belonging to **RURAL CATEGORY**, the certificate must be given in prescribed form generated from NSI website at the time of submission of form.
- (x) For candidates belonging to **DEFENCE CATEGORY**, are required to submit the self-attested copy of certificate from Secretary, Kendriya Sainik Board, Delhi/Secretary, Rajya/Zila Sainik Board /Officer In-charge, Records office/Ist Class Stipendiary Magistrate.
- (xi) For candidates belonging to **physically challenged** category, the self-attested copy of certificate should be on the letter head duly signed by the Chief Medical Officer with seal.
- (xii) Experience certificates should be submitted on the official letter head of Factory only. [**Compulsory for SBCC only**]
- (xiii) **Admit card** will be available online from NSI website.

IMPORTANT DATES AND INFORMATION FOR APPLICANT	
For foreign candidates	
On- line submission of application forms	From 17 th Feb.2020
Last date for submission of on-line Applications	4 th April 2020 (5:00PM)
For Indian candidates	
On- line submission of application forms	From 20 th March 2020
Last date for submission of on-line Applications	4 th May 2020 (5:00 PM)
Last date for receipt of downloaded print outs of on line application forms duly filled & signed, at NSI Kanpur	15 th May 2020(5:00 PM)
Application Fee –For all candidates except SC/ST	Rs. 1500/-
Application Fee – for SC /ST Candidates	Rs. 1000/-
Application fee to be sent in the form of DD drawn in favour of	“Director, National Sugar Institute” payable at Kanpur
Downloading of Admit Cards from web site by all applicants	From 5 th June 2020 onwards
Admission Test for ANSI(ST), ANSI (SE), DIFAT, DSPMM, DIIPA, DQCES, SECC, SBCC, & CCQC.	14 th June 2020 (Sunday) to be held at Pune, Chennai, Delhi, Kanpur, Kolkata & Patna
Address for all Correspondence / Submission of application form by Registered Post / Speed Post	Director, National Sugar Institute, Kalyanpur, Kanpur-208017 E-Mail: nsikanpur@nic.in
For further details and Prospectus visit:	website: http://nsi.gov.in E-Mail: nsikanpur.edu@gmail.com

10. SYLLABUS FOR ENTRANCE EXAMINATION

A.N.S.I. (SUGAR TECHNOLOGY) COURSE-2020

MATHEMATICS (SECTION –A)

- 1 **ALGEBRA AND TRIGONOMETRY** Group, Permutation groups, Subgroups, Centre and Normalizer, Cyclic groups, Coset decomposition, Lagrange's theorem, Homomorphism and Isomorphism, Cayley's theorem, Normal Subgroups, Quotient group, Fundamental theorem of Homomorphism. Introduction to rings, subrings, integral domains and fields, characteristic of a ring, homomorphism of ring, ideals quotient rings. Sequence and its convergence, Convergence of infinite series, Comparison test, Ratio test, Root test, Raabe's test, Logarithmic test. Alternating series, Leibniz's test, Absolute and conditional convergence.
Complex functions, Separation into real and imaginary parts, Exponential, Direct and inverse trigonometric and Hyperbolic functions, Logarithmic functions.
- 2 **MATRICES**- Addition and multiplications, elementary row and column operations, rank determination, solution of system of linear equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem.
- 3 **CALCULUS**- Standard functions, limits. Continuity, properties of continuous functions in closed intervals, differentiability. Rolle's theorem, Mean Value theorem, Taylor's theorem. Maxima and Minima, properties of tangent and normal, curvature, asymptotes, double points, points of inflexion and tracing, Fundamental theorem of integral calculus, method of integration, Rectification, Quadrature, volume and surface of solids of revolution. Partial differentiation and its application. Double and Triple integration, Application of area, volume, centre of mass, moments of inertia etc.
- 4 **DIFFERENTIAL EQUATIONS**- Ordinary differential equations of first order, singular solutions, geometrical interpretations, linear differential equations with constant coefficients. Differential equation of the first order but not of the first degree, Clairaut's equation and singular solutions, linear differential equation of the second order.
- 5 **GEOMETRY**-Analytical Geometry of straight lines and conics referred to Cartesian and Polar coordinates. Three dimensional geometry for planes, straight lines.
- 6 **MECHANICS**- Velocity and acceleration along radial and transverse direction and along tangential and normal directions. Simple Harmonic Motion, Inverse Square Law, Projectiles. Common centenary and centre of Gravity.
- 7 **MATHEMATICAL STATISTICS**- Discrete and continuous distributions (Binomial, Poisson's and Normal Distributions), Moments, Correlation and simple linear Regression.
8. **VECTOR ALGEBRA AND VECTOR CALCULUS**- Vector addition, scalar multiplication and vector multiplication (multiplication of three and four vectors also), applications in geometry, vector Differentiation, Gradient, Divergence and curl and their applications.

CHEMISTRY (SECTION- B)

GENERAL & PHYSICAL CHEMISTRY

1. Chemical equilibrium- Homogeneous and heterogeneous system, equilibrium constant, effect of temperature on equilibrium constant; Law of mass action; definition, verification and its application to simple homogeneous and heterogeneous systems. Le Chatelier & Braun's Principle, its application.
2. Colloids – General method of preparation, properties and uses of colloids; Lyophilic and Lyophobic sol, charge on colloidal particles; Stability, protection and coagulation of colloids; Gold number and its application, Tyndall effect, Brownian Movement.
3. Electrochemistry- Specific, Equivalent and Molar conductivities. Ionic conductance, ionic mobility, Kohlrausch Law. Transport number and its determination. Solubility of sparingly soluble salts. Electrode potential and Nernst equation, Reference electrodes, description and working of hydrogen and glass electrodes and their use in pH determination. Common ion effect, solubility product and its application.
4. Chemical Kinetics- Molecularity and order of a reaction, Derivation of rate constant of first and second order reaction.

5. Catalysis, characteristics, classification, homogeneous, heterogeneous catalysis, enzyme catalysis and miscellaneous examples.

ORGANIC CHEMISTRY

1. Optical and Geometrical isomerism, asymmetric carbon atom, racemisation and resolution of racemic mixtures, resonance and its application in organic chemistry.
2. Methods of preparation, properties and uses of alcohols, aldehydes, ketones, esters, ethers, amines, amides, amino acids and proteins.
3. Carbohydrates- Classification, structure of D-glucose and fructose (open and ring structure), inter-conversion of monosaccharides: aldose to ketose, ketose to aldose, pentose to hexose, hexose to pentose, Killiani's synthesis, Wohl's degradation, epimerization. Disaccharides-manufacture of sucrose, structure and their common reaction, Polysaccharides.
4. Orientation and structure of Benzene. Simple reactions of benzene, toluene, phenols, nitro and amino compounds, benzoic, salicylic, cinnamic & sulphonic acids, aromatic aldehydes and ketones, diazo, azo compounds, naphthalene, pyridine, thiophene and furan.

INORGANIC CHEMISTRY

1. Periodic properties- Ionization potential, Electron Affinity, Electro Negativity, Atomic and Ionic radii, hybridization, Polarization.
2. Oxidation states and oxidation number, common oxidizing and reducing agents, ionic equations and balancing of chemical reactions by oxidation-reduction method.
3. Coordination compounds-double and complex salts, Definition: complex-ion coordination number, nomenclature. Werner's theory of complexes, effective atomic number, stability of complex ions, Stability constant, factors affecting stability, valence bond theory, crystal field theory of complex compounds, methods of study of complexes.
4. Principles of inorganic chemical analysis.
5. Study of d-Block elements and little bit about Lanthanoid-contraction.
6. Metal Carbonyl and idea of back bonding.

PHYSICS (SECTION- C)

1. **Mechanics and Wave Motion:**—Dynamics of particle in rectilinear and Circular Motion, Linear and angular momentum., combined translational and rotational motion of rigid body on horizontal and inclined planes, Relations between elastic constants, Bending of beam, Torsion of cylinder, Law of gravitation, satellites. Differential equation of Simple harmonic motion, Damped and forced vibrations, superposition of waves Phase and group velocity.
2. **Thermodynamics:**-Equipartition of energy, specific heat of gases. Adiabatic expansion, Joule-Thomson expansion and liquefaction of gases. Carnot cycle, Carnot theorem, Entropy, thermo dynamical scale of temperature, Clausius- Clapeyron equation, Adiabatic demagnetization, Black body and Kirchoff's Law.
3. **Basic Electronics:** Growth and decay of current through inductive resistances, Semiconductors, Diode as rectifier Zener Diode. Avalanche and Zener break down. Transistors , LED, Transistor amplifiers, Oscillators cathode ray oscillograph its working and application.
- 4- **Optics and Lasers:** Interference, coherent sources requirement. Lateral shift of fringes. thin films determination of wavelength half period Zones. Diffraction at a slit Diffraction grating (Plan and Convex) Resolving power Polarisation, double refraction in uniaxial crystal . Nicol Prism Optical activity and Fresnel explanation Polarimeters. retardation plates laser action, population inversion Application of lasers.
- 5- **Electro-Magnetics** Electric field and potential due to a charged sphere . Gauss Law and its application. Electric quadrupole. Biot-Savart Law, Lorentz Law, Amperes Circuital theorem , Faraday Law of induction, Lenz's Law, Mutual & Self induction. Ballistic Galvanometer. Dielectrics, magnetic susceptibility para, dia and ferromagnetic materials Hysteresis

6. **Quantum Mechanics:** Photo-electric effect, de Broglie matter wave, Heisenberg Uncertainty principle, spectra of hydrogen, X-ray spectrum and its dependence of voltage, characteristics of x-ray, Mosley Law, Bragg's Law.
7. **Relativity:** Reference frames, Inertial frames, Galilean invariance and conservation laws, Lorentz - length contraction and time dilation, Probability and thermodynamic probability. Bose-Einstein and Fermi-Dirac distribution.
8. **Solid state and Nuclear Physics:** Crystal structure, Three dimensional lattice types. Simple Crystal structure of NaCl, Diamond. Hall effect, General properties of the nucleus, mass defect and binding energy, Nuclear models. Fission and fusion.
9. **Solid State Electronics:** Tunnel diode, Point contact diode, Distortion in amplifiers, Negative and positive feedback in transistor amplifier, FED and their characteristics. Power supplies, Photo transistors

CHEMICAL ENGINEERING (SECTION -D)

1. **Process Calculation:** Law of conservation of mass and energy, Recycle, by pass and purge, its calculation, degree of freedom analysis. Ideal gas law, Dalton's law, Amagat's law, Average molecular weight of gaseous mixture, Vapour pressure, Raoult's law and Henry's law.
2. **Thermodynamics:** First and second Law of thermodynamics and their application. Evaluation of P-V-T-Equation of state and thermodynamic properties of ideal Gases and Real system, phase equilibria, Chemical potential, fugacity, mixture properties, chemical reaction equilibria., Thermodynamic relations, Gibb's phase rule, Carnot cycle, Enthalpy and Entropy.
3. **Fluid Mechanics and Mechanical Operation:** Fluid statics, Newtonian and Non-Newtonian fluids, Bernoulli equation, flow through pipe line system. Flow meters, Pump and compressors, Flow through packed and fluidized bed. Size reduction and size separation filtration, mixing and agitation. Entrance and exit losses in flow process, Rayleigh's method of dimensional analysis, Buckingham's Pi theorem.
4. **Heat Transfer:** Conduction, convection and radiation, Heat transfer coefficient including boiling, condensation and evaporation systems, type of heat exchangers and evaporators and their design, Basic laws of Radiation Black body and Grey body concepts, Furnaces, their classification, principle and design criteria.
5. **Mass Transfer and Transport Phenomena:** Principles and theories of mass transfer, Fick's Law, Film Penetration and Surface renewal theories. Momentum heat and mass transfer analogies, distillation, absorption leaching, liquid-liquid extraction, crystallization, drying, adsorption,
6. **Chemical Reaction Engineering:** Classification of reactors and reactions, Theories of reaction rates, single and multiple reactions in ideal reactors, kinetics of homogeneous reactions, Interpretation of kinetic data. Catalysis and enzyme catalysis, Transport number, Kohlrausch's law, solubility product, redox reaction. Electrochemical & Concentration cell.

Question paper will consist of four sections i.e. Mathematics, (weightage 20%), Chemistry (weightage 40%) & Physics (weightage 20%)& Chemical Engineering(weightage 20%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

11. SYLLABUS FOR ENTRANCE EXAMINATION

A.N.S.I.(SUGAR ENGG.) COURSE - 2020

MECHANICAL ENGINEERING & PRODUCTION ENGINEERING (SECTION– A)

1. **Basic concepts and Laws of Thermodynamics:** Definitions, microscopic and macroscopic properties, Zeroth law, First law, Second law of thermodynamics, Intensive and extensive properties, quasi-static, reversible, irreversible, flow, non-flow, steady flow, throttling processes, Carnot cycle, etc.
2. **Combustion of fuels :** Classification fuels, merits and demerits of liquid, solid and gaseous fuels, calorific value of fuels (HCV and LCV), combustion equations of fuels, minimum volume of air required for complete combustion, gravimetric analysis, conversion of mass analysis to volumetric analysis, excess air, flue gas analysis by Orsat apparatus.
3. **Properties of steam, steam generators, steam turbines and condensers:** Formation of steam, steam tables, Enthalpy and entropy of wet and superheated steam, temperature – entropy and pressure and volume diagrams for steam, constant pressure, constant volume, adiabatic, isothermal, polytropic processes, dryness fraction, Mollier diagram, Types of boilers, functioning, boiler mountings and accessories, performance of boilers, draught in boilers, calculation of chimney diameter, height and efficiency, classification of turbines and principle of operation, compounding, performance of turbines, governing, lubrication system for steam turbine, Classification of condensers, vacuum measurement, mass of cooling water required, air removal, vacuum efficiency etc.
4. **Internal combustion engines, air compressors, Gas turbines:** Classification of I.C. Engines, cyclic operations, Two stroke and four stroke cycle engines, Valve timing diagrams, scavenging, detonation, Rating of Engine fuels (Octane number and Cetane Number), cooling super charging, lubrication, carburetor, governing, spark plug, fuel pump, atomizer, etc.
5. **Heat transfer:** Conduction, thermal conductivity, conduction through flat wall, hollow cylinder, composite cylinder, sphere, convection, free and forced convection, LMTD, heat exchanger, radiation, absorption, reflection and transmission of radiation, plank's Law, Stefan-Boltzman's law, heat transfer coefficient for radiation.
6. **Mechanical engineering design:** Engineering materials and their properties, simple stresses in machine parts, torsional, bending and variable stresses in machine parts, pressure vessels, pipes and pipe joints, welded joints, screwed joints, keys and couplings, shafts, levers, columns and struts, belt and rope drives, fly wheel, bearings, spur, helical and worm gears, etc.
7. **Manufacturing technology:** Manufacturing cycle, manufacturing processes and their selection, engineering materials and their selection, casting, product design, defects, inspection techniques, casting processes, basic design considerations in casting, plastic deformation, hot and cold working, sheet metal operations, heat treatment processes, metal cutting, tool materials, tool geometry, and nomenclature, cutting fluids, single and multipoint cutting operations, production of gears and screw threads, grinding and finishing process, machines tools, introduction to NC, CNC and DNC machining, joining processes, welding process, testing of welded joints, brazing and soldering, mechanical fastening processes, etc.
8. **Computer aided manufacturing and manufacturing automation**
Computer aided design of engineering systems, applications in modeling analysis, design and manufacturing, computer graphics, geometric transformations, computer aided drafting, surface and solid models, customizing, auto cad, lisp, design of surfaces, solid modeling, finite element analysis, definition of automation, reasons for automating, pros and cons of automation, manufacturing operations and automation strategies, production economics, high volume production systems, numerical control production systems i.e. CNC, DNC and adoptive control, industrial robots, automated material handling, storage and retrieval systems, automated inspection and testing principles and methods, sensor technologies for automated inspection, etc.

ELECTRICAL ENGINEERING (SECTION – B)

1. **Electromagnetic Induction:** Relation between magnetism and electricity, production of induced emf and current, Faraday's law of electromagnetic induction, Lenz's law, types of induced emf, coefficient of self inductance, and mutual inductance, coefficient of coupling, Inductances in series and in parallel.
2. **A.C. Fundamentals:** Generation and equations of alternating voltage and current, wave form, cycle, time period frequency, amplitude etc, different forms of emf equation, phase, phase difference, R.M.S. value of half wave rectified, phasor representation of alternating quantities, A.C. through resistance, inductance and capacitance.
3. **A.C. Circuits:** Series A.C. circuit, power factor, active and reactive components of circuits, current, Q-factor of a coil, power in an iron cored choking coil, resonance in R.L.C. circuit, graphic representation of resonance, resonance curve, Q-factor of series circuit, parallel A.C. circuits, Vector and phasor method, application of admittance method, complex or phasor algebra, series – parallel circuits, parallel equivalent of a series circuit, resonance in parallel circuit, phase sequence, parallel circuit, polyphase circuits, generation of three phase velocity, Q-factor of a sequence, numbering of phase, inter connection of three phase, star/delta connection, power factor improvement, power measurement in 3 phase circuit, phase sequence indicators.
4. **D.C. Generators:** Principles, working and construction, types of generators, generated emf and emf equation, losses, efficiencies, characteristics of DC generators, no load curve, critical resistance, critical speed, voltage built up of shunt generators, series generators, compound generators, application of generators.
5. **D.C. Motors:** Principle, comparison with generators, significance of back emf, voltage equation, torque, speed regulation, motor characteristics, performance curves, losses, power stages and efficiency.
6. **Transformer:** Principle of working, construction, emf equation, voltage transformation ratio, losses, equivalent circuit, and approximate equivalent circuit, transformer tests, regulation efficiency, auto transformer, equal and unequal voltage ratio, three phase transformer, connections, parallel operation phase conversion, current transformer, potential transformer.
7. **Induction motors:** Classification, principle and construction, slip frequency of motor current, relation between torque and rotor, power factor, starting torque, effect of change in supply voltage, rotor emf and resistance under running conditions, torque under running conditions, relation between torque and slip, measurement of slip, power stages, rotor output.
8. **Alternator:** Basic principle, construction armature windings, connections, pitch factor, distribution factor, equation of induced emf, effect of harmonics on pitch and distribution factors, vector diagram of a loaded alternator, voltage regulation, three phase alternators parallel operation of alternators, synchronizing of alternators, synchronizing current power and torque, effect of unequal voltage distribution of load.
9. **Power system components:** Single line diagram of power system, brief description of power system elements : synchronous machine, transformer, transmission line, busbar, circuit breaker and isolator, concepts of FACTS.
10. Transmission of Electricity.

Question paper will consist of two sections i.e. Mechanical Engineering and Production Engineering (weightage 60%) & Electrical Engineering (weightage 40%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

12. SYLLABUS FOR ENTRANCE EXAMINATION

POST GRADUATE DIPLOMA COURSE IN INDUSTRIAL FERMENTATION AND ALCOHOL TECHNOLOGY (D.I.F.A.T) -2020

CHEMISTRY (SECTION –A)

GENERAL & PHYSICAL CHEMISTRY

1. **Chemical Equilibrium**- Homogeneous and heterogeneous system, equilibrium constant, effect of temperature on equilibrium constant; Law of mass action ; definition, verification and its application to simple homogeneous and heterogeneous systems
2. **Colloids** – General method of preparation, properties and uses of colloids; Lyophilic and Lyophobic sol, charge on colloidal particles; Stability, protection and coagulation of colloids; Gold number and its application
3. **Electrochemistry**- Specific, Equivalent and Molar conductivities. Ionic conductance, ionic mobility, Kohlrausch Law. Transport number and its determination. Solubility of sparingly soluble salts. Electrode potential and Nernst equation, Reference electrodes, Description and working of hydrogen and glass electrodes and their use in pH determination.
4. **Chemical Kinetics**- Molecularity and order of a reaction, Derivation of rate constant of first and second order reaction.

ORGANIC CHEMISTRY

1. Methods of preparation, properties and uses of alcohols, aldehydes, ketones, esters, ethers, amines, amides, amino acids proteins. Carbohydrates, polysaccharides & sugars.
2. Benzene and its structure. Simple reactions of benzene, toluene, phenols, nitro and amino compounds, benzoic, salicylic, cinnamic, sulphonic acid, aromatic aldehydes and ketones, diazo, azo compounds, naphthalene, pyridine, thiophene and furan.

INORGANIC CHEMISTRY

1. Periodic properties- Ionization potential, Electron Affinity, Electro negativity, Polarization.
2. Oxidation states and oxidation number, common oxidizing and reducing agents, ionic equations and balancing of chemical reactions by oxidation- reduction method.
3. Coordination compounds- double and complex salts, Definition: complex-ion coordination number, nomenclature. Valence bond theory, crystal field theory of complex compounds, methods of study of complexes.
4. Principles of inorganic chemical analysis.

INDUSTRIAL CHEMISTRY & APPLIED CHEMISTRY - (SECTION- B)

A. Industrial Aspects Of Organic And Inorganic Chemistry.

1. Nomenclature: Generic names, Trade names
2. Raw materials for organic compounds: Petroleum, Natural gas, Fractionation of crude oil, cracking, reforming, hydro forming and Isomerisation.
3. Coal: Types of coal, properties, calorific value, distillation of coal, chemicals derived from them. 4. Renewable Natural resources: Cellulose, Starch:-properties, modification, important industrial chemicals derived from them. Alcohols, oxalic acid and Furfural.
4. Metallurgical operations pulverization, calcination, roasting refining etc. extraction of iron, copper, lead, silver, sodium, aluminium etc.

B. Industrial Aspects Of Physical Chemistry

1. **Surface chemistry and Interfacial phenomena:** Adsorption isotherm, Sols, Gels, Emulsions, Micro emulsions, Micelles, Aerosols, Effect of Surfactants, Hydro tropes.
2. **Catalysis:** Introduction, Types, Basic principles, mechanisms, factors affecting the performance, introduction to phase transfer catalysis, Enzymes catalyzed reactions- rate model, industrially important reactions.

C. Material Science and Industrial Pollution.

1. **Polymeric Materials:** Industrial polymers and composite materials—their constitutions, chemical and physical properties.
2. **Industrial pollution:** Pollutants and their statutory limits, pollution evaluation methods. Water pollution – organic/inorganic pollutants Pesticide pollution, Radiation pollution and Green House Effect.

D. Effluent treatment & Waste management and Process Instrumentation.

1. Principles and equipment for aerobic, anaerobic treatment, adsorption, sedimentation. Electrostatic precipitator, Mist eliminator, Wet scrubbers, Absorbers.
2. Solid waste management, Industrial safety.
3. Thermometer, pH meter, conductivity meter, manometer, barometers, pressured gauge,

E. Environmental Analysis in Process Industries.

Environmental Chemistry, determination of pH, acidity alkalinity, total suspended solids(TSS), total dissolved solids(TDS), total hardness and Ca & Mg hardness, chloride, sulphate, nitrate, oil and grease, DO, COD, BOD chlorine demand, limit test for heavy metals- Pb, As, Hg, Fe and ash content

BIOCHEMISTRY & BIOTECHNOLOGY(SECTION –C)

1. MOLECULAR GENETICS

Basic structure and function of cell, cell cycle, control of cell cycle, Chromatin organization, Molecular basis of life: Structure and function of DNA and RNA; basics of cell signalling, Bioenergetics: Laws of thermodynamics. Mendelian principles and inheritance, Law of segregation, Law of independent assortment, Sex determination and sex-linked inheritance. Basics of DNA replication, transcription and translation

2. GENERAL BIOCHEMISTRY

1. **CARBOHYDRATES** Structure and properties of monosaccharide, disaccharides. oligosaccharides and polysaccharides, Mutarotation, Inversion of sucrose, color test with sugars, Estimation of total reducing sugar by fehling solution, tests to differentiate aldehyde and ketone. Metabolism of carbohydrates including glycolysis, HMP pathway, glyoxalate cycle, TCA cycle, Entner- Duodoroff pathway, gluconeogenesis, Pasteur effect.
2. **PROTEINS** : Outline of the structure of the common amino acids present in proteins, their general properties, metabolism of amino acids including deamination, transamination and decarboxylation, physical & chemical properties, classification and structure of proteins. Isolation, purification and estimation of proteins.
3. **NUCLEIC ACIDS:** Outline of the structure & functions of purine & pyrimidine bases, nucleosides and nucleotides, structure and biosynthesis of nucleic acids. Genetic Code, Evidence & Essentiality of Codon, Triplet code, start and stop codons. Overlapping genes and reading frames, universality of genetic code, Protein synthesis, mechanism in prokaryotes, Post translational modification and cell secretion.
4. **ENZYMES:** Nature, occurrence, classification of enzymes, outline of enzyme kinetics, competitive, non-competitive and uncompetitive inhibition, enzyme activity and importance of enzymes in fermentation industry

5. Vitamins and Minerals

3. GENERAL MICROBIOLOGY

The microscope, spontaneous generation, biogenesis, fermentation, germ theory of diseases, Microbial Diversity: Prokaryotes and Eukaryotes, Microalgae, Microfungi, Protozoa, Bacteria and Viruses, Bacterial size, shapes and pattern of arrangement, Structures external to cell wall: Flagella, Pili, Capsule, sheath, Prosthecae and stalk. The cell wall structure: Gram positive and gram-negative bacteria. Structures internal to cell wall: Cytoplasmic membrane, Cytoplasmic inclusion and nuclear material. Reproduction and growth of bacteria & Yeast. Modes of cell division, Growth curve, Lag phase, Exponential phase, stationary phase and death phase, Nutritional requirements. Nutritional types of bacteria, Phototrophs, Chemotrophs, Autotrophs, Heterotrophs, Obligate parasites. Bacteriological media, Selective media, Maintenance media, Differential media. Control of microorganisms, Definitions and fundamentals of control, Physical agents / processes for control: high temperatures, low temperature, dessication, osmotic pressure, radiation, filtration, host parasite interaction: pathogenicity, virulence and infection.

Nature of the Gene, one gene one enzyme hypothesis, gene-protein relation, Genetic fine structure, Colinearity of gene & protein, Inducible and constitutive operons, Manipulation of DNA: denaturation of DNA by heat, reassociation of complimentary strands, Engineering: restriction enzymes, formation of recombinant DNA, vectors, cloning strategies, detection of clone genes, applications of recombinant DNA technology, PCR technology.

4. AN INTRODUCTION TO IMMUNOLOGY

Introduction to immunology, Innate and adaptive immunity; Defense mechanisms of host: physical barriers, chemical barriers, biological barriers, Fever, Inflammation and Phagocytosis.

CHEMICAL & BIOCHEMICAL ENGINEERING (SECTION – D)

CHEMICAL ENGINEERING

1. Material balance involving chemical reaction: Law of conservation of mass & energy. Recycle , bypass & purges, its calculations, degree of freedom analysis. Ideal gas law, Dalton's Law, Amagat's Law, Average molecular weight of gaseous mixture, vapour pressure, Dalton's Law & Henry's Law.
2. Energy Balance: Heat capacity of pure gases & gaseous mixtures, sensible heat , changes in liquids, enthalpy changes.
3. Fluid flow: Fluid statistics, Newtonian and non Newtonian fluids, Bernoulli's equation. Flow through pipe line systems, flow meters, pump & compressors, vacuum pumps, ejectors.
4. Heat transfer: Conduction, Convection & radiation. Heat transfer coefficient including boiling& condensation, types of heat exchangers, like shell & tube type, plate type heat exchangers , refrigeration cycles and systems.
5. Distillation: Introduction, phase equilibria, equilibrium diagram and boiling point diagram. Binary systems, and their distillation systems, batch distillation and continuous distillation and the details of distillation columns both Plate & packed type separation of azeotropes.

BIOCHEMICAL ENGINEERING

1. **Introduction** – Definition and scope of Biochemical Engineering, history of biochemical engineering, commercial aspects of biochemical processes, different biochemical unit operations and processes.
2. **Microbial Growth Kinetics**:- Media design optimization and preparation for growth of microorganisms ,Microbial growth in closed , semi open and open cultivation systems, maintenance energy and yield concept, parameters of growth and analysis of growth data, microbial kinetics of growth, substrate utilization and product formation in batch, plug flow and chemo state culture.
3. **Media and Air Sterilization**:-Principles and design of batch and continuous media sterilization processes. Theory and methods of air sterilization, Design of air filters.
4. **Aeration and Agitation** : Demand and supply of oxygen in microbial system , masses transfer theory concept of Volumeter mass transfer coefficients (K_2a) , factors affecting it and methods for measurement power requirements in gassed and un gassed systems , Rheology of fermentation fluids
5. **Kinetics of Enzymatic Reactions**: Characteristics of enzymes, Enzyme catalyzed reactions, Factors influencing the rate of enzymatic reactors, Michaelis- Men ten Kinetics, Estimation of V_{max} and K_m . immobilization of enzymes

6. **Bioreactors and Scale up:** Mode of reactor operation, Ideal reactor models Batch, Fed batch, Extended fed batch, continuous stirred tank (CSTR), plug flow mono chemo state, scale-up criteria selection of scale-up criteria practical considerations for bioreactor contraction
7. **Bioreactor control mechanisms:** Control of physical, chemical and biological environment of the bioreactor. Advanced control strategies viz. PID controllers, fuzzy logic based controllers and artificial neural and artificial neural network based controllers, Role of physical, chemical & biological sensors.
8. **Down- Stream Processing:** Role of downstream processing, Recovering and purification of products problems and requirements of bio product purification, separation processes flocculation sedimentation, centrifugation, Filtration, Extraction, Distillation Ad operation, chromatography, electro dialysis, drying, ultra filtration, electrophoreses and isoelectric focusing , cell, disruption.
9. **Biological waste-water treatment:** Principle of biological oxidation of waste water, mathematical expressed and graphical representation of BOD removal and sludge growth , operation and design features of aerobic biological treatment processing oxidation pond, truckling filter, rotating biological contractor(RBC). Activated sludge process , Anaerobic treatment system sludge digestion theory, digester design, high rate digestion UASB, Nitrification and denitrification Phosphorus removal, characterization and treatment of waste water of the sugar industries such as distilling , Brewing , and antibiotics.

Question paper will consist of four sections i.e. Chemistry (weightage 25%), Industrial Chemistry/Applied Chemistry (weightage 25%), Biochemistry/Biotechnology (weightage 25%) & Chemical & Biochemical Engineering (weightage 25%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

13. SYLLABUS FOR ENTRANCE EXAMINATION

POST GRADUATE DIPLOMA IN SUGAR CANE PRODUCTIVITY & MATURITY MANAGEMENT (DSPMM)– 2020

AGRICULTURE CHEMISTRY (SECTION-A)

1. **Irrigation & water:**-Sugarcane (crops) water Requirement, Relationship of the water requirement with soil texture, control of wastage of irrigation water, quality & Effect of irrigation water.
2. **Irrigation Methods:**- Flooding Method, Thala Method, Sprinkler & Drip irrigation, Boarder Method, Limitations & benefits of each irrigation Method.
3. **Measurement of irrigation water:**-‘B’ Katawa & Kulawa, Hectare, cm, Meter method of measurement.
4. **Necessity of Drainage:**-Disadvantages of High Moistured soils, Land development & improvement, Land preparation, General farm management & control.
5. **Accidents:**-Flood, Cyclone, Earthquake, Sensitive Zones, Control measurement of losses.
6. Weeds & Weedicides of sugarcane.
7. Plant protection chemicals used in sugarcane with quantity and method of application.
8. Anatomy of plants.
9. Structure of flower & their function of different parts.
10. Pollination
11. Fertilization
12. Type of Fruits
13. **Seed**
 - (a) External& internal structure of seed.
 - (b) Types of germination.
 - (c) Factor affecting of the seed germination.
 - (d) Types of seed.
 - (e) Methods of dispersal of & seed & its importance.
14. Cell and its structural organization
15. Plant phyosology
 - (a) Plant water relation
 - (b) Mineral nitrogen nutrition in plants
 - (c) Cellular respiration.
 - (d) Photosynthesis
16. Classification of plants
17. Diversity of life
 - (a) Five kingdom of life and Biological classification
 - (b) Kingdom monera
 - (c) Kingdom fungi
 - (d) Kingdom plante
 - (e) Virus
18. Inorganic Chemistry :- Classification of Elements, Hard & Soft water, Nitrogen & Nitrogen Cycle, Ammonia, Nitric Acid, Carbon, Carbon dioxide, Phosphorus & Phosphoric acid, Sulphur, Sulphur dioxide, Sulphuric acid, Chlorine, Hydrolic acid, Sodium & Potassium, Calcium, Iron &Aluminium.
19. Organic Chemistry :- Nomenclature & Classification of Organic Compounds, Alkene or Paraffins, Alkene or olifins, Alkayne or Acetylene, Alcohol Glycerol, Aldehyde & Ketone, Carboxylic acid, Amine & Amide, Oil, Fat & Soaps, Carbohydrates, Benzene & phenol.

CHEMISTRY (SECTION- B)

1. Chemical equilibrium- Homogeneous and heterogeneous system, equilibrium constant, effect of temperature on equilibrium constant; Law of mass action ; definition, verification and its application to simple homogeneous and heterogeneous systems. Le Chateleir& Braun’s Principle, its application.
2. Colloids – General method of preparation, properties and uses of colloids; Lyophillic and Lyophobic sol, charge on colloidal particles; Stability, protection and coagulation of colloids; Gold number and its application, Tyndall effect, Brownian Movement.

3. Electrochemistry- Specific, Equivalent and Molar conductivities. Ionic conductance, ionic mobility, Kohlrausch Law. Transport number and its determination. Solubility of sparingly soluble salts. Electrode potential and Nernst equation, Reference electrodes, Description and working of hydrogen and glass electrodes and their use in pH determination. Common ion effect, solubility product and its application.
4. Chemical Kinetics- Molecularity and order of a reaction, Derivation of rate constant of first and second order reaction.
5. Catalysis, characteristics, classification, homogeneous, heterogeneous catalysis, enzyme catalysis and miscellaneous examples.
6. Optical and Geometrical isomerism, asymmetric carbon atom, racemisation and resolution of racemic mixtures, resonance and its application in organic chemistry.
7. Methods of preparation, properties and uses of alcohols, aldehydes, ketones, esters, ethers, amines, amides, amino acids and proteins.
8. Carbohydrates- Classification, structure of D-glucose and fructose (open and ring structure), inter-conversion of monosaccharides: aldose to ketose, ketose to aldose, pentose to hexose, hexose to pentose, Killiani's synthesis, Wohl's degradation, epimerization. Disaccharides-manufacture of sucrose, structure and their common reaction, Polysaccharides.

Question paper will consist of two sections i.e. AGRICULTURE CHEMISTRY (weightage 60%) and CHEMISTRY (weightage 40%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

14. SYLLABUS FOR ENTRANCE EXAMINATION

POST GRADUATE DIPLOMA IN INDUSTRIAL INSTRUMENTATION & PROCESS AUTOMATION (DIIPA)- 2020

INSTRUMENTATION ENGINEERING (SECTION –A)

1. **Electronics:-** Semiconductor diode and its applications; Bipolar transistors, Transistor Biasing Circuits, Single Stage Transistor Amplifier; Field Effect Transistors. Number System, Logic Gates and Families, Logic Simplification, Arithmetic circuits, Decoders, Multiplexers and De Multiplexers, Sequential Circuits, Counters, Shift Register, A/D and D/A Converters.
2. **Linear and Digital Integrated Circuits:-** Basics of Operational Amplifiers, Op-amp with Negative Feedback, General Linear Application, Active Filters, Comparators, Timer and Multi vibrator. Basics of Logic Families such as RTL, DTL, TTL, ECL, IIL, CMOS etc and their application.
3. **Electronic Instruments and Measurements:-** Voltage, Current and Resistance Measurement, Cathode Ray Oscilloscope, AC Bridges and Q Meters, Digital Instruments.
4. **Transducers and Process Instrumentation & Control:-** Variable Resistance Transducers, Variable Inductance transducer, Variable capacitance Transducers, Piezoelectric Transducers, Hall effect sensor, Optical transducers, Techo-generator, Thermocouples, Principle of Analog Signal Conditioning. Measurement of Pressure , Torque, Power, Speed and Force, Measurement of Stress and Strain, Measurement of Motion, Thickness Measurement, Measurement of Density, pH, Humidity and Viscosity; Basic Control Loops and Characteristics, Controller Modes and Characteristics, Electrical Control Elements, Pneumatic and Hydraulic Control Elements, Control Valves, Switches.
5. **Control System:-** Feedback principles, signal flow graphs, differentials equation-transfer function, transient response, steady-state-errors, Bode plot, phase and gain margins, Routh and Nyquist criteria, root loci, design of lead, lag and lead-lag compensators, state-space representation of systems; time-delay systems; mechanical, hydraulic and pneumatic system components, synchro pair, servo and stepper motors, servo valves; on-off, P, P-I, P-I-D, cascade, feed-forward, and ratio controllers

BASIC ENGINEERING (SECTION –B)

1. **Electrical Engineering and Machines:-** Circuits Analysis, KCL, KVL, Batteries, Magnetism and Electromagnetism, Electromagnetic Induction, AC Fundamentals, AC Circuits, Poly-Phase systems. DC generators, DC motors, Transformers, Alternators, Synchronous Motors, Induction Motors.
2. **Mechanical Engineering:-** Isothermal and adiabatic changes, First and Second law of thermodynamics, Thermal Conductivity, Black Body Radiation, Bernoulli's Theorem and its application, Biologers.
3. **Microprocessor:-** Introduction to 8085 & 8086, Basic Configuration and architecture, Instruction set and assembler directives, Parallel and Serial Communication, DMA Controller.
4. **Engineering Mathematics:-** Linear Algebra, Calculus, Differential equations, Analysis of complex variables, Probability and Statistics, Laplace Transform, Z-Transform

Question paper will consist of two sections i.e. Instrumentation Engineering (weightage 60%) and Basic Engineering (weightage 40%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

15. SYLLABUS FOR ENTRANCE EXAMINATION
POST GRADUATE DIPLOMA IN QUALITY CONTROL
& ENVIRONMENTAL SCIENCE
(DQCES)- 2020

CHEMISTRY (SECTION- A)

PHYSICAL CHEMISTRY

1. Colloids – General method of preparation, properties and uses of colloids; solution, types of solution, Buffer solution, Acid & Base Buffer, Buffer capacity, difference between suspension, colloids & solutions, Lyophilic and Lyophobic sol, charge on colloidal particles; Stability, protection and coagulation of colloids; Gold number and its application, Tyndall effect, Brownian Movement.
2. Electrochemistry- Conduction in metals & in Electrolytes solution, Kohlrausch Law, Debye's Huckel's Onsager's equation. Electrode reactions, Nernst's equation, Electrolytic & Galvanic cell, Calculations of E.M.F, Electrochemical Series.
3. Chemical Kinetics- Rate of reaction, Factors influencing the rate of reaction, Molecularity and order of a reaction, Half life time, Mean life time, Radioactive Decay,
4. Catalysis, characteristics, classification, homogeneous, heterogeneous catalysis, enzyme catalysis and miscellaneous examples.
5. Crystallization : Difference between crystalline and amorphous solids. law of crystallography Space lattice and unit cell, Bravais lattices, Seven crystal systems. Point defects; Schottky defects, Frenkel defects

ORGANIC CHEMISTRY

1. Methods of preparation, properties and uses of alcohols, phenols, ethers, aldehydes, amines, amides, ketones, carboxylic acids.
2. Arenes & Aromaticity: Orientation and structure of Benzene. Aromatic Electrophilic substitution., naphthalene & Anthracene.
3. Carbohydrates- Classification, structure of D-glucose and fructose (open and ring structure), Mutarotation, optical activity, specific rotation, Isomers, Enantiomers, inter-conversion of monosaccharides: aldose to ketose, ketose to aldose, pentose to hexose, hexose to pentose, Killiani's synthesis, Wohl's degradation, epimerization. Disaccharides-manufacture of sucrose, structure and their common reaction, Polysaccharides.
4. Amino acid, Peptides, Proteins & Nucleic acid

INORGANIC CHEMISTRY

1. Atomic structure: Aufbau Principle, Hund's Rule, Heisenberg uncertainty Principle & Pauli
2. Exclusion Principle
3. Periodic properties- Ionization potential, Electron Affinity, Electronegativity, Atomic radii.
4. Chemical Bonding: Valence bond theory, Valence shell electron pair repulsion theory, Hybridization
5. Molecular orbital theory, crystal field theory & Hydrogen bonding.
6. Acids and Bases; Arrhenius, Bronsted - Lowry, Lewis, Lewis acid, HSAB concept of acid and base.
7. Bio Inorganic chemistry: Essential and trace elements in biological process, Hemoglobin,
8. Myoglobin, chlorophyll, Nitrogen fixation.

ENVIRONMENTAL SCIENCES & BIO-TECHNOLOGY (SECTION - B)

A. BIOCHEMISTRY AND METABOLISM

CARBOHYDRATES: Structure and properties of monosaccharide, disaccharides, oligosaccharides and polysaccharides, Metabolism of carbohydrates including glycolysis, HMP pathway, glyoxalate cycle, TCA cycle, Entner- Duodoroff pathway, gluconeogenesis, Pasteur effect.

PROTEINS : Outline of the structure of the common amino acids present in proteins, their general properties, metabolism of amino acids including deamination, transamination and decarboxylation, physical & chemical properties, classification and structure of proteins. Isolation, purification and estimation of proteins.

NUCLEIC ACIDS: Outline of the structure & functions of purine & pyrimidine bases, nucleosides and nucleotides, structure of nucleic acids. Genetic Code, Evidence & Essentiality of Codon, Triplet code, start and stop condons. Protein synthesis, mechanism in prokaryotes, Post translational modification and cell secretion.

ENZYMES: Nature, occurrence, classification of enzymes, outline of enzyme kinetics, competitive, non-competitive and uncompetitive inhibition, enzyme activity and importance of enzymes in fermentation industry

B. MICROBIOLOGY AND MICROBIAL GENETICS

The microscope, spontaneous generation, biogenesis, fermentation, Microbial Diversity: Prokaryotes and Eukaryotes, Protozoa, Bacteria and Viruses, Bacterial size, shapes and pattern of arrangement, Structures external to cell wall: Flagella, Pili, Capsule, sheath, Prostheca e and stalk.

The cell wall structure: Gram positive and gram negative bacteria. Structures internal to cell wall: Cytoplasmic membrane, Cytoplasmic inclusion and nuclear material.

Reproduction and growth of bacteria & Yeast. Modes of cell division, Growth curve, Lag phase, Exponential phase, stationary phase and death phase, Nutritional requirements. Nutritional types of bacteria, Phototrophs, Chemotrophs, Autotrophs, Heterotrophs, Obligate parasites. Bacteriological media, Selective media, Maintenance media, Differential media. Control of microorganisms, Definitions and fundamentals of control, Physical agents / processes for control: high temperatures, low temperature, dessication, osmotic pressure, radiation, filtration, host parasite interaction: pathogenicity, virulence and infection,

C. MOLECULAR BIOLOGY AND BASIC GENETIC ENGINEERING:

Nature of the Gene, one gene one enzyme hypothesis, gene-protein relation, Genetic fine structure, Co linearity of gene & protein, Inducible and constitutive operons, Manipulation of DNA: denaturation of DNA by heat, reassociation of complimentary strands,.

D- ENVIRONMENTAL SCIENCES

Components of Environment – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment; Environmental Studies as a multidisciplinary subject. Global Environmental Problems – Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards. Positive and negative interactions of populations – competition, predation, parasitism, mutualism.

Ecosystem : Basic concepts, components of ecosystem. Trophic levels, food chains and food webs. Ecological pyramids, ecosystem functions. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Environmental pollution and degradation – Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies. Noise pollution.

Environmental Management – Concept of health and sanitation.

Environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.

Bioremediation – Oil spills, Wastewater treatment, chemical degradation, heavy Metals. (8 periods)
Definition, Scope and basic principles of ecology and environment. Biological levels of organization, population, community, ecosystem and biosphere.

E. ELEMENTARY IMMUNOLOGY

Defense mechanisms of host: physical barriers, chemical barriers, biological barriers, Fever, Inflammation and Phagocytosis. innate and specific immunity.

F. BASIC BIOCHEMICAL BIOPHYSICAL TECHNIQUES AND BIOMATHS

Basic environmental techniques: Colorimetry, Chromatography – paper chromatography, Thin layer chromatography, Column chromatography, Gas chromatography, Gas Liquid chromatography

Sampling methods : Random and non random sampling – concepts of mean (Arithmetic mean, Geometric mean, Harmonic mean), mode, median, Standard deviation and Standard error t-test and Chi. Square test

Question paper will consist of two sections i.e. Chemistry (weightage 50%) and Environmental Sciences / Biotechnology_(weightage 50%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

16. SYLLABUS FOR ENTRANCE EXAMINATION

SUGAR ENGINEERING CERTIFICATE COURSE(SECC) - 2020

MECHANICAL & PRODUCTION ENGINEERING (SECTION- A)

1. **Strength of Materials:-** Stresses and Strains, Resilience, Moment of Inertia, Bending Moment and Shearing Force, Bending stresses, Columns, Torsion, Springs.
2. **Thermodynamics:-** Fundamental Concepts, Laws of Perfect Gases, Thermodynamic Processes on Gases, Laws of Thermodynamics, Ideal and Real Gases, Properties of Steam, Steam Generators, Air Compressors, Introduction to Heat Transfer.
3. **Hydraulics and Pneumatic Systems:-** Pressure and its Measurement, Flow of Fluids, Flow through Pipes, Flow through Orifices, Hydraulic Machines, Water Turbines and Pumps. Pneumatic Elements –Pipes, Air Compressors, Pneumatic Cylinders; Pneumatic Valves- Type, symbols, working, applications and selection criteria.
4. **Theory of Machines:-** Simple Mechanisms, Power Transmission, Flywheel, Governor, Balancing, Vibrations.
5. **CNC Machines and Automation:-** Introduction to NC, CNC & DNC, Construction and Tooling, Part Programming, Problems in CNC Machines, Automation and NC system.
6. **Production Management:-** Management approach to Planning, Analysis and Control functions involved in a Production System; Production cycles, planning functions; Types of industry : Job, Batch, Continuous, Mass and Flow Productions; Organization and policies in respect of production planning and control; Product design and development; Forecasting techniques; Scheduling, Sequencing and plant loading for optimal utilization; Queuing models and line balancing; Materials Planning and Control, Inventory Management; Value Analysis; Productivity Analysis, Mechanics of production control.

ELECTRICAL ENGINEERING (SECTION -B)

1. **Fundamentals of Electrical Engineering:** DC Circuits, Batteries, Magnetism and Electromagnetism, Electromagnetic Induction, AC Fundamentals, AC Circuits, Poly-Phase systems.
2. **Electrical Machines:** DC generators, DC motors, Transformers, Alternators, Synchronous Motors, Induction Motors.
3. **Energy Sources and Management of Electrical Energy:** Various energy sources, Importance of non-conventional sources of energy, present scenario, future prospects and economic criteria; Energy Conservation & Management-Energy efficiency, Need for energy efficient devices, Energy conservation in Industrial sector (Motors, Industrial lighting, Distribution system, Pumps, Fans, Blowers etc.)
4. **Estimating and Costing in Electrical Engineering:** Types of wiring, Estimating and Costing - Domestic installations, Industrial installations, Estimating the material required for Transmission and distribution lines (overhead and underground) & Substation.
5. **Electrical Power (Generation, Transmission and Utilization):**Power Generation, Economics of Generation, Transmission Systems - Constructional features of transmission lines, Mechanical features of lines, Electrical features of lines; Substations - Switch Gears, Protection Devices Faults, Protection Scheme. Power Factor and its importance; Illumination, Electric Heating, Electric Welding, Electrolytic Processes.
6. **Industrial Electronics and Control of Drive:** SSCR and its applications, Thyristor Control of Electric Drives, Uninterrupted Power Supplies.

Question paper will consist of Two sections i.e. Mechanical / Production Engineering (weightage 60%) & Electrical Engineering (weightage 40%). Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

17. SYLLABUS FOR ENTRANCE EXAMINATION

SUGAR BOILING CERTIFICATE COURSE (SBCC) - 2020

PAN BOILING PROCESS (SECTION-A)

1. General idea about various raw materials and crops for Sugar Manufacture, their cultivation, production etc.
2. General information about the equipment & Machinery installed in mill and Boiling House.
3. An overview of the Working, Types and Design of Equipment's used for sugar manufacture: (from Milling to Sugar Bagging).
4. Basic of Steam , Vapor bleeding etc,
5. Basics of the Process of vacuum pan boiling, Types and Grades of Sugar Produced, Boiling Schemes, Masecuities, Molasses their purities, Brixes, Grain Sizes etc.
6. Preparation of A masecuite, B masecuite & C masecuite or R1, R2,& R3 etc. masecuities.
7. Methods of slurry preparation, False grain & conglomerates.
Different instruments Used in Vacuum Pan control and their Designs.
8. Different types of Vacuum Pans used in the sugar industry, their parts, connections, etc.
9. Comparison between batch pan & Continuous pan.
10. Details of Vacuum Generation, Temperatures and Vacuum in Pans and Evaporators, usage of Condensate etc.
11. General Idea about the Working and designs of Crystallizers, Centrifugal, Grader etc.

MATHEMATICS & SCIENCE (SECTION –B)

1. Basics of Percentage, Fractions, Simple Interest, Compounds Interest, Work – Time and Speed calculations.
2. Surface Area and Volume of different shapes such as Triangle, Rectangle, Trapezium cuboids, cylinder, cone, sphere etc.
3. Fundamental and secondary units and their conversion related to Weight, Time, Length, Area, Volume, Temperature etc.
4. General Information about pressure, temperature, Volume of Gases, Gas laws, Law of diffusion, Rate of diffusion, Atmospheric pressure and its effects.
5. Laws of Force, Motion, Work, Energy, Momentum, Torque, Couple etc.
6. Evaporation, Boiling point, Freezing point, Melting point, Elevation of Boiling point, Depression of Freezing point, , Temperature Scales, Principle of Calorimeter etc.

Question paper shall consist of two sections i.e. Pan Boiling Process and Mathematics & Science. Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.

18. SYLLABUS FOR ENTRANCE EXAMINATION

CERTIFICATE COURSE IN QUALITY CONTROL (CCQC) - 2020

MATHEMATICS (SECTION –A)

Algebra:-

Logarithms – Properties of logarithms

Complex Number as an order pair of real numbers in the form of $a+ib$, (a,b) ,

Use of the formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ in solving quadratic equation.

Simple problems of arithmetic, geometric & harmonic progression

Trigonometry:-

Angles: convention of sign of angles, magnitude of an angle, the relation $s = r\theta$ where θ is in radians, truth of the identity $\sin^2 X + \cos^2 X = 1$, relationship between trigonometric functions.

Coordinate Geometry:-

Basic concepts of points and their coordinates, slope & gradient of a line, angle between two lines, various forms of equation of lines, distance of a point from a line, distance between parallel lines. Conic sections, circle, ellipse, parabola, hyperbola and their properties.

Statistics:- Estimation of mean, median & mode. Graphical Presentation of Data

CHEMISTRY (SECTION – B)

Basic concepts of chemistry – Properties of matter & their measurements, Dalton's atomic theory, laws of chemical combination, Avogadro's Hypothesis, Atoms & Molecules, chemical equivalents, volumetric and gravimetric calculation, empirical & molecular formula. Electro chemistry, with special reference to pH and conductivity measurement, theory of solutions with special reference to solubility and solubility products, common ion effect.

Surface Chemistry – Adsorption, colloidal state, emulsions & chromatography.

Chemical Kinetics – Rate of affecting rate of reaction, dependence of rate of reaction on concentration, order and molecularity chemical reaction, factors of a reactions.

Organic Chemistry & Organic compounds- Detection of elements in organic compounds (qualitative analysis), estimation of elements in organic compounds (quantitative analysis), Calculation of empirical & molecular formula.

Carbohydrates- General concept, mono, di and oligosaccharides, Reducing and Invert sugars, Specific rotations, Polarization, Polaroids. Refractometry and Hygrometry.

Question paper will consist of two sections i.e. Mathematics and Chemistry. Each section will be of equal marks. In each section questions shall be of objective, short answer and long answer type. Candidates may attempt all the sections.