DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. ACAD/NP/B.E. Chem.Engg.II Yr./Syllabus/85/2012

It is hereby informed to all the concerned that, the Hon'ble Vice-Chancellor has accepted the **"Revised Syllabus of Second Year Chemical Engineering", under the Faculty of Engineering and Technology** on behalf of the Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994 as appended herewith.

This will be effective from the academic year 2012-2013 and onwards.

All concerned are requested to note the contents of this circular for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/NP/CHEM.ENG-II/
2012/18966-88

Date:- 31-07-2012.

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Director,
Board of College and
University Development.

Copy forwarded with compliments to:-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [Engineering Unit],
3] The Superintendent, [Eligibility Unit] ,
4] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S/310712/-*

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Revised Syllabus of

CHEMICAL ENGINEERING

SECOND YEAR ENGINEERING

[Effective from 2012-13 & onwards]

RULES AND REGULATIONS

FOR

SECOND YEAR DEGREE COURSE IN ENGINEERING (REVISED)

(Applicable from the Academic Year 2012- 2013)

Note:

1. All the Rules and Regulations, hereinafter specified shall be read as a whole for the purpose of interpretation.

ADMISSION

1. Admission to second year engineering shall be carried out as per the rules and regulations prescribed by the competent authority as appointed by the Government of Maharashtra and Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, from time to time.

DURATION AND COURSES OF STUDY

1. The duration of the course is four years. Each of the four academic years shall be divided into two semesters herein after referred to as the semester I and semester II in chronological order. Each semester shall comprise,

   Instructions ..... 15 weeks
   Preparation holiday ..... 2 weeks or 15 days
   (Includes practical exams)

2. Candidate who fails to fulfill all the requirements for the award of the degree as specified hereinafter within eight academic years from the time of admission, will forfeit his/her seat in the course and his/her admission will stand cancelled.

RULES AND REGULATION OF ATTENDANCE

1. Candidates admitted to a particular course of study are required to pursue a "Regular course of study" as prescribed by the University before they are permitted to appear for the University Examination.
2. "A regular course of study" means putting in attendance not less than 75% for individual subject.
3. a) In special cases and for sufficient causes shown, the Principal of the institute may, on the specific recommendation the Head of the Department, condone the deficiency in attendance to the extent of 15 % on medical ground subject to submission of medical certificate.

b) However, in respect of women candidates who seek condonation of attendance due to pregnancy, the Principal may condone the deficiency in attendance to the extent of 25 % (as against 15 % Condonation for other) on medical grounds subject to submission of medical certificate to this effect. Such condonation be availed twice during the entire course of study
leading to degree in Engineering and Technology.

4. "Active Participation in N.C.C/N.S.S. Camps or Inter collegiate or Inter University or Inter State or International matches or debates of Educational Excursions or such other Inter University activities as approved by the authorities involving journeys outside the city in which the college is situated will not be counted as absence. However, such 'absence shall not exceed (4) weeks per semester of the total period of instructions. Such leave should not be availed more than twice during the entire course of study.

5. The attendance shall be calculated on individual papers/subjects from the date of commencement of the semester.

6. In case of the candidates who fail to put in the required attendance in a course of study, he/she shall be detained in the same class and will not be recommended to appear for the University examination.

7. A candidate detained in semester I should take readmission in next academic year as a regular student and shall have to complete all the theory and practicals as a regular student.

8. In case a candidate is detained in semester II, he/she shouldl take admission to Semester II of next academic year and complete all the theory and practicals as a regular student of semester II

9. In case of change of syllabus the candidate even if detained in semester II should take readmission in next academic year for Semester I and II as a regular student and complete all the theory and practicals as a regular student.

SCHEME OF INSTRUCTIONS AND EXAMINATION

1. Instructions about the curriculum in the various subjects in each semester of all the four years shall be provided by the University.

2. The details of instruction period, examination schedule, vacations etc. shall be notified by the Principal of the College as per the University academic calendar

3. The medium of instruction and examination shall be English.

4. At the end of each semester, University examinations shall be held as prescribed in the respective schemes of examination.

5. The examinations prescribed may include written papers, practical and oral, tests, inspection of certified sessional work in Drawing and Laboratories and work done by students in each practical examination, along with other materials prepared or collected as part of Lab work/Project.

6. All the rules for examinations prescribed by the University from time to time shall be adhered to.

7. A candidate shall be deemed to have fully passed the Examination of a semester, if he/she secures not less than the minimum marks/grade as prescribed.

8. Institutions will be encouraged to adopt modern tools in classroom/labs to deliver the course contents.

9. Institutions will be encouraged to conduct online class tests.

O.874

The SecondYear Examination in Engineering will be held in two parts S.E. semester-I and S. E. semester- II. No candidate wi" be admitted to S.E. semester-I examination unless he/she produce testimonials of having kept one term, for the subject under F.E. semester-I and II satisfactorily in a college of engineering affiliated to this University after passing the First year examination of engineering other examination recognized as equivalent thereto as per the admission rules to second year engineering prescribed by the
Government of Maharashtra and Dr. B.A.M.University from time to time.

FACULTY OF ENGINEERING AND TECHNOLOGY

Proposed Revised Structure of SE (Chemical)

Subject Number	Semester-I	Contact Hrs/week			Examination Scheme					Duration of Theory Examination
	Subject	L	P	Total	TH	CT	Pr.	TW	Total	
BSH201	Engineering Mathematics-III	04		04	80	20	-	-	100	03 Hrs
BSH202	Engineering Chemistry	04		04	80	20	-	-	100	03 Hrs
BSH203	Physical Chemistry & Thermodynamics	04		04	80	20		-	100	03 Hrs
CHE204	Chemical Process Calculations	04		04	80	20	-	-	100	03 Hrs
CHE205	Fluid Mechanics	04		04	80	20	-	-	100	03 Hrs
CHE221	LAB-I: Engineering Chemistry	-	04	04	-	-	50	-	50	
CHE222	LAB-II: Physical Chemistry & Thermodynamics	-	04	04	-	-	50	-	50	
CHE223	LAB-III: Fluid Mechanics	-	02	02		-	-	50	50	
CHE224	LAB-IV: Theory and Drawing of Equipment	-	04	04	-	-	50	50	100	
	Total	20	14	34	400	100	150	100	750	

Subject Number	Semester-I	Contact Hrs/week			Examination Scheme					Duration of Theory Examination
	Subject	L	P	Total	TH	CT	Pr.	TW	Total	
BSH251	Engineering Mathematics-IV	04		04	80	20	-	-	100	03 Hrs
CHE252	Heat Transfer	04		04	80	20	-	-	100	03 Hrs
CHE253	Mechanical Operations	04		04	80	20	-	-	100	03 Hrs
CHE254	Process Instrumentation and Analytical Techniques	04		04	80	20	-	-	100	03 Hrs
CED255	Strength of Materials	04		04	80.	20	-	-	100	03 Hrs
CHE271	LAB-V: Heat Transfer	-	02	02			50	-	50	
CHE272	LAB-VI: Mechanical Operations	-	02	02	-		50	-	50	
CHE273	LAB-VII: Process Instrumentation and Analytical Techniques	-	02	02			-	50	50	
CHE274	LAB-VIIII: Computer Laboratory	-	02	02			50	-	50	
BSH275	LAB-IX: Communication Skills	-	02	02			-	50	50	
	Total	20	10	30	400	100	150	100	750	

L: Lecture hours per week P: Practical hours per week CT: Class Test

TH: University Theory Examination TW: Term Work Pr: Practical /oral Examination

R.1861

i. In case a candidate fails in one or more heads of passing at the S.E. semester-I Examination after taking that examination at the end of first term as a regular student, he/she will be allowed to appear again for only those heads of passing in which he/she has failed at his/her immediately subsequent semester-I examination.

ii. That the marks obtained by the candidate at semester-I Examination shall be carried forward unless the candidate desires to appear for a paper in which he has failed and then gracing of marks should be done as as a whole for semester-I and semester-II examination taken together.

R.1862

a) Candidates who secure 45% or more but less than 50% marks in the aggregate and pass the examination will be declared to have passed the examination in Pass Division.

b) Candidates who secure 50% or more but less than 60% marks in the aggregate and pass the examination will be declared to have passed the examination in Second Division.

c) Candidates who secure 60% or more but less than 66% marks in the aggregate and pass the examination will be declared to have passed the examination in first Division.

d) Candidates who secure 66% or more marks in the aggregate and pass the examination will be declared to have passed the examination in First Division with Distinction.

e) For calculating the percentage for the purpose of giving weightage while awarding division in Final Examination to the students admitted to first year engineering, the maximum marks prescribed and the marks obtained by the examinee in the particular examinations shall be taken into consideration with the following weightages.

F.E. - 10%
S.E.- 10%
T.E. – 40%
B. E. – 40%

This shall be applicable for the students admitted in first year from academic year 2011-2012 onwards.

f) In case of the students directly admitted to the second year, the weightage while awarding Division in Final Examination the maximum marks prescribed and the marks obtained by the Examinee in the particular examinations shall be taken in to consideration

S.E.- 20%

T.E. – 40%

B. E. – 40%

This shall be applicable for the students admitted in first year from academic year 2012-2013 onwards.

R.1863

In case a candidate fails in the examination but desires to appear again thereat.

a) He may, at his option, claim exemption form appearing in the head or heads of passing in which he has passed.

b) Such exemption, if claimed, shall cover all the heads of passing- in which it can be claimed.

c) Such exemption, if not availed of at the immediately subsequent appearance of the candidate at the examination, shall be deemed to have lapsed.

d) He /She may, at his option claim exemption from appearing in head or heads of passing of his choice and appear in the remaining head or head/s of passing to make-up the deficiency in the aggregate, if he has passed in all the heads of passing but has failed to secure a minimum of 45% of the aggregate marks.

e) The Marks obtained by a candidate for such term work as separately assessed will be carried over unless fresh term work is presented by him. A candidate whose marks are thus carried over shall be eligible for a division provided he/she does not avail himself of exemption in any head of passing excepting term work.

f) For the purpose of deciding whether a candidate claiming exemption in accordance with (a), (b), (c) above or (d) and (e) above has as required by R.260 secures 45% of the total marks obtainable in the whole examination the marks at his/ her previous examination/examination in the head or heads of passing in which he/she is exempted will be carried over. Candidates passing the examination in this manner shall not be eligible for a division or prizes or scholarships at the examination.

R.1864

RULE FOR COMBINED PASSING

1) To pass the examination a candidate must obtain minimum 40% of Marks in each Theory Paper &class test taken together however the candidate must obtain minimum 35% of Marks at the University theory Examination. The candidate must obtain a minimum aggregate of 45% of the total Marks obtainable at the S.E. Semester -I & II Examination taken together.

To pass a subject where there is no provision of class test, the candidate must obtain 40% of Marks in the

University Examination.

Gracing should be done for the performance at University Examination or University Examination and class test taken together.

Minimum two-class tests should be conducted in a semester for the theory subject if provided. The average performance of the Two-class tests should be forwarded to the University by the college along with the term work marks.

If candidate fails to secure 40% of marks at university theory examination and class test taken together at the regular semester examination, then he/she shall have to appear for university examination from subsequent examination onwards and secure 40% of marks at university examination and earlier obtained class test marks taken together. The improved performance at the university examination should not be Considered for the Merit/Medal/Prize etc.

If the candidate remains absent for the class-test, his performance should be treated as 'Zero' Marks.

Minimum marks required for passing in term work and practical shall be 40%. If a candidate secures

less
than 40% in any of the term work or fails to submit term work shall be detained in the same class.

RULE FOR A T K T

For securing ATKT at Second Year Engineering Course candidate should clear (pass) as per the provision of R.1864[A] in at least 12 heads of passing out of 16 heads of passing.

R.1865

GENERAL RULES OF EXAMINATION

1. Application for permission to appear at every examination shall be made in the prescribed format accompanied by one passport size full face photograph (not profile) along with the necessary certificates and the prescribed fee, should be submitted to the Principal of the institute on or before the date fixed for this purpose.

2. When a candidate's application is found in order and he/she is eligible to appear at an Examination, the Principal of the institute is empowered to furnish him/her with a Hall-Ticketwith the photograph affixed to it, enabling the candidate to appear in the Examination, and this Hall- Ticket shall have to be produced by the Candidate before he/she is admitted to the premises where
the Examination is being held.

3. A Candidate who does not present himself/herself for the examination for any reason whatsoever, excepting shortage of attendance, shall not be entitled to claim refund of the whole or part of the examination fee, for subsequent Examination(s).
4. As engineering is a full time course, no candidate shall be allowed to put in attendance for acourse or appear at examinations for different degrees and different faculties at one and the same time.
5. Students who have appeared once at any examination of the course need not put in fresh attendance, if they wish to reappear at the corresponding examination, notwithstanding the fact that the College may have introduced new subject. They will, however, have to appear at the examinations according to the scheme of examination and syllabi in force

R.1866

EQUIVALENCE OF THE SUBJECTS

Whenever a course or scheme of instruction is changed in a particular year, three more examinations immediately following thereafter shall be conducted according to the old syllabi/regulations. Also candidates not appearing at the examinations or failing in them shall take the examination subsequently according to the changed syllabi/ regulations as per the equivalence of the subjects as prescribed by the University.

Proposed Coding System of Subject/Paper

Six digit code for a subject (UG course)

Batch	Year	Subject no
CED	1. First Year UG	Semester-I
MED	2. Second Year UG	1-20 Theory
EEP	3. Third Year UG	21-30 practical
ECE	4. Fourth Year UG	31-40 Service Courses
EXE	5. Fifth Year UG	41-49 Electives
ETC		Semester-II
IEX		51-70 Theory
PED		71-80 Practical
CSE		81-90 Service Courses
CHE		91-99 Electives
CTD		
COE		
ITD		
EED		
EEE		
ARH		
BSH		
BTD		

Structure of syllabus of subject

Code No: **Title:**

Teaching Scheme **Examination Scheme**

Theory: hours/week **Class Test: Marks**

Tutorial: hours/week **Theory examination: Maximum hours**
Practical/ TermWork : hours/week **Theory examination: Maximum Marks**
Practical/ Oral examination: Maximum Marks

Objectives: 1
2
3

Unit 1:
Unit 2:
Unit 3:
Unit 4:
Unit 5:
Unit 6:

Text Books: 1
2

Reference Books: 1
2
3
4

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should have at least eight bits of two marks out of which five to be solved
4. Two questions from remaining questions from each section A and B be asked to solve having weightage of 15 marks

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section

3. Question no 1 from section A and Question no 5 from section B be made compulsory and should have at least five bits of two marks out of which three to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 7 marks.

0.95 GRACE MARKS FOR PASSING IN EACH HEAD OF PASSING (THEROY / PRACTICAL / ORAL / SESSIONAL) (EXTERNAL / INTERNAL)

The examinee shall be given the benefit of grace marks only for passing in each head of passing (Theory/practical/Oral/ Sessional) in external or Internal examination as follows:-

Head of passing	Grace Marks upto
Up to 50	2
051 to 100	3
101 to 150	4
151 to 200	5
201 to 250	6
251 to 300	7
301 to 350	8
351 to 400	9
And 401 and above	10

Provided that the benefit of such gracing marks given in different heads of passing shall not exceed 01 (one) percent of the aggregate marks in that examination.

Provided, further that the benefit of gracing of marks under this ordinance shall be applicable only if the candidate passes the entire examination of semester/year.

Provided further that this gracing is concurrent with the rules and guidelines of professional statutory bodies at the All India level such as AICTE, MCI, Bar Council, CCIM, CCIH, NCTE, UGC etc.

0.96 GRACE MARKS FOR GETTING HIGHER CLASS

A candidate who passes in all the subjects and heads of passing in the examination without the benefit of either gracing is condonation rules and whose total number of marks falls short for securing Second Class/Higher Second class of First Class by marks not more than 01 percent of the aggregate marks of that examination or up to 10 marks, whichever is less, shall be given the required marks to get the next higher class or grade as the case may be.

Provided that benefit of the above mentioned grace marks shall not be given, if the candidate fails to secure necessary passing marks in the aggregate head of passing also, if prescribed in the examination concerned.

Provided further that this gracing is concurrent with the rules and guidelines of professional statutory bodies at the All India level such as AICTE, MCI, Bar Council, CCIM, CCIH, NCTE etc.

0.97 GRACE MARKS FOR GETTING DISTINCTION IN THE SUBJECT ONLY.

A candidate who passes in all the subject/heads of passing in the examination without benefit of either gracing or condonation rules and whose total number of marks in the subject/s falls short by not more than three marks for getting distinction in the subject/s shall be given necessary grace marks up to three in maximum two subjects, subject to maximum 01(one) percent of the total marks of that head of passing whichever is more, in a given examination.

Provided that benefit of the above-mentioned grace marks shall be given to the candidate only for such examination/s of which provision for distinction in a subject has been prescribed.

Provided further that this gracing is concurrent with the rules and guidelines of professional statutory bodies at the All India level such as AICTE, MCI, Bar council, CCIM, CCIH, NCTE etc.

0.98 CONDONATION

If a candidate fails in only one head of passing, having passed in all other heads of passing, his/her deficiency of marks in such head of passing may be condoned by not more than 01 percent of the aggregate marks of the examination or 10 percent of the total number of marks of the head of passing in which he/she is failing, whichever is less. However, condonation, whether in one head of passing or aggregate head of passing be restricted to maximum upto 10 marks only.

Condonation of deficiency of marks be shown in the statement of marks in the form of asterisk and ordinance number.

Provided that this condonation of marks is concurrent with the rules and guidelines of

Professional statutory bodies at the all india level such as AICTE, MCI, Bar council, CCIM,CCIH,NCTE etc.

0.106 (A) UNFAIR MEANS COMMITTED BY THE STUDENT

1. The Board of Examinations shall be the competent authority to take disciplinary action against a student for his misconduct due to his unfair means committed by him at the examination conducted by the University.

2. The Principal, of the college or Head of the recognized Institution shall be the competent authority to take disciplinary action against a student for his misconduct due to his unfair means committed by him at the examination conducted by the University, recognizedInstitution of behalf of the University.

3. Definition- Unless the context otherwise requires

(a) Student means and includes a person who is enrolled as such by the University/college/Institution for receiving instruction qualifying for any degree, diploma or

certificate awarded by the University. It includes ex-student and student registered as candidate (examinee) for any of the Degree, Diploma or Certificate examinations.

(b) Unfair Means includes one or more of the following acts or omissions on the part of student/s during the examination period.

i. Possessing unfair means material and or copying there from.
ii. Transcribing any unauthorized material or any other use thereof.
iii. Intimidating or using obscene language or threatening or use of violence against invigilator or person on duty for the conduct of examination or man-handling him/her or leaving the examination hall without permission of the supervisor or causing disturbances in any manner in the examination proceedings.
iv. Unauthorized communicating with other examinees or any one else inside or out side the examination hall.
v. Mutual/Mass copying
vi. Smuggling out, either blank or written or smuggling in of answer books as copying material.
vii. Smuggling in blank or written answer book, forging and forging signature of the Jr. Supervisor therein.
viii. Interfering with or counterfeiting of University/College Institution seal or answer books or office stationary used in the examination.
ix. Impersonation at the University/college/Institution examination.
x. Revealing identity in any form in the answer written or in any other part of the answer book by the student at the University or College or Institution examination.
xi. Or any other similar act/s omission/s which may be considered as unfair means by the competent authority.

(c) "Unfair means relating to examination" means and includes directly or indirectly communicating or attempting to commit or threatening to commit any act or coercion, undue influence or fraud or malpractice with a view to obtaining wrongful gain to him or to any other person or causing wrongful loss to other person/s.

(d) "Unfair means material" means and includes any material whatsoever, related to the subject of the examination, printed, typed, handwritten or otherwise on the person or on clothes, or body of the student (examinee) or on wood or other material, in any manner or in the form of chart,
diagram, map or drawing or electronic aid etc. which is not allowed in the examination hall.

(e) "Possession of unfair means material by a student" means having any unauthorized material on his/her person or desk or chair or table or at any place within his/ her reach, in the examination centre and its environs or premises at any time from the commencement of the examination till its conclusion.

(f) " Student found in possession" means a student reported in writing as having been found in possession of unfair means material by Jr. Supervisor, Sr. Supervisor, member of the Vigilance committee or Examination squad or any other person authorized for this purpose in this behalf, even if the unfair means material is not produced as evidence because of its being reported as swallowed or destroyed or snatched away or otherwise taken away or spoiled by the student or by any other person acting on his behalf to such an extent that it has become illegible.

Provided that report to that effect is submitted by the Sr. Supervisor or chief Conductor or any other authorized person to the Controller of Examinations, Principal or Head of the Institutions concerned or any officer authorized in this behalf.

(g) Material related to the subject of Examination means and includes, if the material is produced as evidence any material certified as related to the subject of examination by a competent person and if the material is not produced as evidence or has become illegible for any of the reasons refereed to in clause (f) above, the presumption shall be that the material did relate to the subject of the examination.

(h) "Chief Conductor", means and includes, Principal of the College concerned, or Head of the recognized institution concerned where concerned examination is being conducted and any other person duly authorized by him or person appointed as In charge of examination, by the authority competent to make appointment to such post.

4. Where the examination of the University courses are conducted by the constituent college/recognized Institute on behalf of the University, the Principal/Head of the concerned college/recognized Institution on receipt of a report regarding use of unfair means by any student at any such examination including breach of the rules laid down by the Management council or by the College/recognized institution for proper conduct of examination, shall have power at any time to institute inquiry and to punish such unfair means or breach of any of the rules by exclusion of such a student from any such examination or any University course in any college/Institution either permanently or for a specified period or by cancellation of the result of the student in the college/recognized Institution examination for which he/she appeared or by deprivation of any college/Institution scholarship or by cancellation of the award of any college/Institution prize or medal to him/her or by imposition of fine not exceeding Rs.300/- or in any two or more of the aforesaid ways.

5. During examination, examinees and other students shall be under disciplinary control of the Chief Conductors.
6. Chief Conductor/s of the examination centre shall in the case of unfair means, follow the procedure as under:-

(a) The student shall be called upon to surrender to the Chief Conductor, the unfair means material found in his or her possession, if any, and his/her answer-book.

(b) Signature of the concerned student shall be obtained on the relevant materials and list thereon. Concerned Senior Supervisor and the Chief Conductor shall also sign on all the relevant materials and documents.

(c) Statement of the student and his undertaking in the prescribed format and the statement of the concerned Jr. Supervisor and Sr. Supervisor shall be recorded in writing by the Chief Conductor (Appendix-III). If the student refuses to make statement or to give undertaking the concerned Sr. Supervisor and / or Chief Conductor shall record accordingly under their signature.

(d) Chief Conductor shall take one or more of the following decisions depending upon seriousness/gravity of the case:-

i) In the case of impersonation or violence, expel the concerned student from the examination and not allow him/her to appear for remaining examination.

ii) Obtain undertaking from the student to the effect that the decision of the concerned competent authority in his/her case shall be final and binding and allow him/ her to continue with his/ her examination.

iii) May report the case to the concerned Police Station as per the provision of Maharashtra Act No. XXXI 1982 – An act to provide for preventing Malpractice's at University Board and other specified examinations (Appendix-III) (Performa A& B).

iv) Confiscate his / her answer books, mark it as suspected unfair means case and issue him/her fresh answer books duly marked.

v) All the material and list of material mentioned in sub-clause (a) and the undertaking with the statement of the student and that of the Jr. Supervisor as mentioned in clause No. (b) & (c) and the answer-book/s shall be forwarded by the Chief conductor along with his report to the concerned Controller of Examinations/Principal/Head of the Institution, as the case may be, in a separate and confidential sealed envelope marked " suspected unfair means case"

vi) In case of unfair means of oral type, the Jr. Supervisor and the Sr. Supervisor or concerned authorized person shall record the facts in writing and shall report the same to the concerned Controller of Examinations/Principal/Head of the Institutions, as the case may be.

PUNISHMENT

The competent authority concerned i.e. the Board of Examinations in the case of University examination, the concerned Principal in the case of college examinations held by the recognized Institutions, after

taking into consideration the report of the committee shall pass such orders as it deem fit including granting the student benefit of doubt, issuing warning or exonerating him/her from the charges and shall impose any one or more of the following punishment on the student/s found guilty of using unfair means:-

(a) Annulment of performance of the student in full or in part in the examination he/she has appeared for.

(b) Debarring student from appearing for any examination of the University or college Institution for a stipulated period not exceeding five year.

(c) Debarring student from appearing for any examination of the University or college Institution for a stipulated period not exceeding five year.

(d) Cancellation of the University or College or Institution scholarship/s or award/s prize or medal etc. awarded to him/her in that examination.

(e) In addition to the above mentioned punishment, the competent authority may impose a fine not exceeding Rs.300/- on the student declared guilty. If the student concerned fails to pay the fine within a stipulated period, the competent authority may impose on such a student additional punishment/penalty as it may deem fit.

(f) The student concerned be informed of the punishment finally imposed on him/her in writing by the competent authority or by the officer authorized by it in this behalf, under intimation to the College/Institution he/ she belongs to.

(g) An appeal against the findings of the committee shall lie with the concerned competent authority whose decision shall be final and binding.

(h) An appeal made in writing within a period of 30 days from the date imposition of the punishment shall be considered by the competent authority on merit and shall be decided on the basis of the evidence available in the case and shall be heard in person in deserving cases, if the competent authority finds substance in the appeal, the competent authority shall supply a typed copy of the relevant extract of fact-finding report of the inquiry committee, as well as documents relied upon (if not strictly confidential). Decision in the appeal shall be informed to the student concerned accordingly.

(i) The court matters in respect of the unfair means cases should be dealt with by the respective competent authority.

(j) As far as possible the quantum of punishment should be as prescribed (Category-wise in Appendix- I

APPENDIX-I

THE BROAD CATEGORIES OF UNFAIR MEANS ADOPTED BY STUDENTS AT THE UNIVERSITY/ COLLEGE/ INSTITUTION EXAMIANTION AND THE QUANTUM OF PUNISHMEN
T FOR EACH CATEGORY THEREOF.

Sr. No.	Nature of Malpractices	Quantum of Punishment
1.	Possession of copying material	(Note:- This quantum of punishment Shall apply also ot the following categories of malpractices at Sr. No. 2, to Sr. No.12 in addition to the Punishment prescribed thereat)
2.	Actual copying from the copying material	Exclusion of the student from university or College or Institution examination for one additional examination.
3.	Possession of another students Answer Book	Exclusion of the student from University or College or Intuition examination for one additional examination (Both the students)
4.	Possession of another students Answer book+ actual evidence of Copying	Exclusion of the student from University or College or Institution examination for two additional examination (Both the Students)
5.	Mutual / Mass copying.	Exclusion of the student from University or College or Institution examination for two additional examinations.
6 (a)	Smuggling out or smuggling in of Answer book as copying material.	Exclusion of the student from University or College or Institution examination for two additional examinations.
(b)	Smuggling in of written answer book based on the question paper set at the examination	Exclusion of the student from University or College or Institution examination for three additional examinations
(c)	(c) Smuggling in of written answer book and forging signature of Jt, Supervisor thereon	Exclusion of the student from University or College or Institution. Examination for four additional examinations.

7.	Attempt to forge the signature of the Jr. Supervisor on the answer book or Supplement.	Exclusion of the student from the University or College or Institution examination for four additional examinations.
8	Interfering with or counterfeiting of University / College/ Institution seal or Answer books or office stationary used in the examination	Exclusion of the student from University or College or Institution examination for four additional examinations.
9.	Answer book main or supplement written outside the examination hall or any other insertion in answer book.	Exclusion of the student from University or College or Institution examination for four additional examinations.
10.	Insertion of currency notes/to bribe or attempting to bribe any of the persons/s connected with the conduct of Examination	Exclusion of the student from University or College or Institution Examination for four additional examinations. (Note:- This money shall be created to the Vice-Chancellor's Fund)
11.	Using obscene language/violence/ threat at the examination centre by a student at the University/ College / Institution Examination to Jr./ Sr. Supervisor/ Chief Conductor or Examiners.	Exclusion of the student from University or College or Institution examination for four additional Examinations.
12.(a)	Impersonation at the University/ College / Institution examination	Exclusion of the Student from University or College or Institution examination for five additional examinations, (Both the students if impersonator is University or College or Institute student)
(b)	Impersonation by a University/ College/ Institute student at S.S.C./ H.S.C./ any other Examinations.	Exclusion of the Student from University or College or Institution examination for five additional examinations
13.	Revealing identity in any form in the answer written or in any other part of the Answer book by the student at the University or College or Institution Examination	Annulment of the performance of the student at the University or College or Institution Examination in full.
14.	Student found having written on palms or on the Body, or on the clothes while in the	Annulment of the performance of the student at University or College or

	Examination	Institution Examination in full.
15.	All other mal-practices not covered in the aforesaid categories.	Annulment of the performance of the student at the University or college or Institution Examination in full and severe punishment depending upon the gravity or the offence.
16.	If on previous occasion a disciplinary action was taken against a student for malpractice used at examination and he/she is caught 'again for malpractices used at the examinations, in this event he/she shall be dealt with severely. Enhanced punishment can be imposed on such student. This enhanced punishment may extend to double the punishment provided for the offence when committed at the second or subsequent examination.	
17.	**PRACTICAL/DISSERTATION/PROJECT REPORT EXAMS.**	
	Student involved in malpractices at practical/ dissertation/ project report examination shall be dealt with as per the punishment provided for the theory examination.	
18.	The competent authority in addition to the above mentioned punishments may impose a fine not exceeding Rs. 300/- on the student declared guilty.	
	Note:- The term annulment of performance in full' includes performance of the student of the theory as well as annual practical examination, but does not include performance at term work, project work and dissertation examination unless malpractice used thereat.	

Code No:BSH201 **Engineering Mathematics-III**

Teaching Scheme	Examination Scheme
Theory: 4 hours/week	Class Test: 20 Marks
Tutorial: 1 hours/week/Batch of 30 Students	Theory examination: Maximum hours: 3 Hrs.
	Theory examination: Maximum Marks: 80

Objectives: 1) To develop Logical understanding of the subject
2) To develop mathematical skill so that students are able to apply mathematical methods & Principal's in solving problems from Engineering fields
3) To produce graduates with mathematical knowledge & computational skill.

Unit 1: Linear Differential Equations : Linear Differential Equations with constant coefficients General method, shortcut methods to find particular integral, Homogenous Linear differential equations (Cauchy's & Legendre's form), method of variation of parameters. (6)

Unit 2: Application of LDE: To Electrical circuits & to Mechanical system (Analogous study of two systems), to Chemical Engineering, Free oscillations / vibrations, Forced oscillation /vibrations, Damped Free oscillations / vibrations, Damped Forced oscillations / vibrations. (6)

Unit 3: Statistics & Probability: Measures of Dispersion, Moments, coefficient of skewness and Kurtosis, Probability distribution for random variables, Binomial, Poisson and Normal distributions, Curve fitting: Principle of least squares, Fitting of linear curve, parabola, exponential curve. (8)

Unit4: Vector Differentiation: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field. (6)

Unit 5: Vector Calculus (Integral calculus): The line integral, Surface integral, volume integral, Gauss Divergence theorem, Stoke's theorem, Green's theorem (6)

Unit 6: Numerical Methods: Solution of transdental equations by Newton Raphson method, Gauss Seidel method to solve simultaneous linear equations, Lagranges Interpolation formula for unequal intervals, Numerical Differentiation: - Newton's forward and Newton's Backward difference formulae, Solution of ordinary differential equation by Euler's modified method, and Runge-Kutta IVth order method . (8)

Note: All Theorems are without proofs
Section A: Unit 1, 2, 3
Section B: Unit 4, 5, 6

Reference Books:

1. **A Text Book of Engineering Mathematics (Volume-I, II,III)** by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2. **Higher Engineering Mathematics** by B. S. Grewal, Khanna Publications, New Delhi.
3. **Advanced Engineering Mathematics** by H.K. Das, S. Chand & Company.
4. **Higher Engineering Mathematics** by B.V. Ramana (Tata McGraw-Hill).
5. **Advanced Engineering Mathematics** by Erwin Kreyszig, Wiley Eastern Ltd.
6. **Engineering Mathematics A Tutorial Approach** by Ravish R Singh, Mukul Bhat ,Mc Graw Hill

Pattern of Question Paper:

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:BSH202 **Engineering Chemistry**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop understanding related to synthesis of organics
2) To produce graduates with knowledge of reaction mechanism & synthetic chemistry.

Unit I: Aromatic Hydrocarbons: **(8 hours)**
Preparation, Properties and uses of Benzene, Naphthalene and Anthracene, Structure determination of benzene. **Heterocyclic Compounds:** Preparation, properties and uses of: Pyrrole, Thiophene, Furan, Pyridine and Quinolene.

Unit II Carbohydrates & Dyes: **(8 hours)**
Manufacture of Sucrose and Glucose, their reaction and structure determination and industrial use.
Dyes: Introduction, dyeing, isolation, constitution, synthesis and properties of (1) Indigotin (2) Methyl Orange, (3) Alizarin. (4) Congored.

Unit III: Amines.
(4 hours)
Mono, Di and Tri amines, their general preparations, separations and reactions. Aniline and diazotization reaction. General properties of diazonium salts.

Unit IV Study of the following unit processes. **(8 hours)**
Nitration: Nitrating agents, Mechanism of nitration of aromatics, process equipments typical nitration process for making nitrobenzene and chloronitrobenzene Sulphonation: Reagents for sulphonation, mechanism of sulphonation of aromatics, preparation of aliphatic and aromatic sulphonates and sulphates. Sulphonation of lauryl alcohol, dimethyl ether etc. Halogenation: Reagents for halogenation, mechanism of halogenations of aromatics, preparation of chlorobenzene, DDT, BHC etc. Uses of LiAlH4 and peracids.

Unit V: Reactions, mechanisms and Industrial applications **(8 hours)**
Knoevanagel's reaction, Gatterman Koch reaction, Claisen rearrangement, Pinacol-Pinacolone rearrangement, Michel reaction, Deckmann Condensation, Benzil-Benzilic acid rearrangement, Beckmann Rearrangement.

Unit VI: Chemistry of Natural products: **(4 hours)**
Simple turpines. General methods of extraction and separation, their physical and chemical properties, Geranial and alpha-pinene

REFERENCE BOOKS:

1. Organic chemistry Vol-I & II by Finar IL
2. Text book of organic chemistry by Soni PI.
3. Unit processes In synthesis by Groggin P.H.
4. Organic chemistry by Morrison and Boyd.
5. Textbook on quantitative and qualitative organic chemistry by Vogel .A. I
6. Organic Chemistry by O.P. Agrawal.
7. Pitter Sykes, Organic reactions and mechanism, Orient Longman-1986
8. Reaction, rearrangements and reagents by S.N. Sanyal
9. Chemistry of Organic natural products Vol-I & II by O.P. Agrawal.
10. Heterocyclic chemistry by Raj K. Bansal.

Pattern of Question Paper:
The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:BSH203 **Physical Chemistry and Thermodynamics**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives : 1) Physical Chemistry is the base of all the Chemical Industries.
2) To develop practical skill which helps the students in Chemical Industries?

Unit 1: Electrolyte: Conductance, Ionic mobility's, Galvanic Cells, Classification of electrodes, determination of Standard EMF, and its application, Cell reaction, Thermodynamics of electrolytes solutions, Dehye and Hackle theory. **(06)**

Unit 2: Colloidal state, Adsorption, Molecular structure & properties: Relation between molecular structure and properties such as surface tension, viscosity, refractivity and dipole moments. Introduction, Types of colloidal states. Classification, preparation, properties of colloidal Systems (hydrophobic & hydrophilic). Emulsifiers, gels, foams, etc. and their applications. Adsorption Heat of adsorption, factors influencing adsorption, adsorption isobar and adsorption isotherms Langmuir's umimolecular adsorption and limitations. BET Theory and verification of BET equation and related problems . (10)

Unit 3: Photochemistry: Laws of photochemistry, quantum efficiency, kinetics of photochemical reactions. Photochemical equilibrium, photosensitized reactions, photochemical phenomena. Radiation chemistry, ionization radiation and electron impact process. **(04)**

Unit 4: Introduction : Basic concepts of work., energy, heat, internal energy. The first law of thermodynamics, thermodynamic state & state functions. Enthalpy, the steady state flow process. Equilibrium, the reversible process. Heat capacities & specific heat. Numerical based on the above. **(06 Hrs.)**

Unit 5: The phase rule : Phase, degree of freedom of a system, the phase rule & its thermodynamic derivation. Application of phase rule to one and two component systems. . Numerical based on the above.. Volumetric properties of pure fluids : The PVT behavior. The Virial equations & its applications. Ideal gas, Cubic equations of state, Accentric factor. The behavior of liquids. . Numerical based on the above. **(10 Hrs.)**

Unit 6: The Second law of Thermodynamic : The Second law of Thermodynamic, heat engines, the thermodynamic temperature scale. The concept of entropy. Entropy changes & irreversibility. The third law of thermodynamics. Numerical based on the above. **(04 Hrs.)**

Reference Books:

1. Principles of Physical Chemistry by Puri & Sharma
2. Physical Chemistry by Peter Atkin.
3. Advanced Physical Chemistry by Gurdeep, Raj.
4. Introduction to Chemical Engineering Thermodynamics by J M Smith & Van Ness
5. Chemical Engineering Thermodynamics, T. E. Daubert McGraw Hill Publication.
6. Chemical Process Principles Part - II O. A. Hougen et al John Wiley Publication.

Pattern of Question Paper:

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE204 **Chemical Process Calculations**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop Logical understanding of the subject
2) To understand fundamental calculations and principles related to chemical processes.
3) To produce graduates with knowledge of making basic chemical engineering calculations.

UNIT 1:

Introduction to Process Calculations. Basic & derived units, Stoichiometric relations, different ways of expressing the composition of mixtures and solutions. Properties Of Gases Liquids & Solids : Ideal & real gas laws. Critical properties, properties of mixtures & solution, phase Equilibria, phase rule. Laws of Dalton & Amagat and their applications. Vapor pressure: vaporization, effect of temperature on vapor pressure, vapor pressure plot, Estimation of critical properties. vapor pressure of immiscible liquids solutions, Raoult's law.

UNIT 2 :
Humidity & Saturation :Humidity, Saturation, Dew point, Vaporization & Condensation processes, Wet & Dry bulb thermometry. Psychometric chart, Solubility diagrams. Thermo physics: Heat capacity of gases, liquids, solids & solutions. Kopp's rule, Latent heats, heat of fusion & vaporization.

UNIT 3:

Material Balance: Concepts of limiting & excess reactants, recycle, purging, bypass in batch, stage wise & continues operations in systems with & without chemical reaction in unit operation.

UNIT 4:

Thermo chemistry : Heats of formation, combustion, reaction, neutralization and their applications. Heats of mixing solution. Dilution, the effect of pressure & temperature on them. Temperature of reaction. Use of enthalpy concentration charts. Energy balances for system with & without chemical reaction. Process efficiency.

UNIT 5:

Fuels and Combustion : Basic concepts. Types of fuels, heating values of fuels, theoretical & excess air. Material and Energy balances- heat & combustion calculations.

UNIT 6 :

Applications : Application of material and energy balance to typical chemical industrial processes. Unsteady material balance & energy balances & its applications.

Reference Books

1 Stoichiometry by Bhat B I & Vora S.M, Tata McGraw Hill Co. Ltd.

2 Basic Principles & Calculations in Chemical Engineering by Himmelblau D M. Prentice Hall of India Ltd.

3 Chemical Process Principles Part I by Hougen D A & Watson K M John Wiley & Sons.

4 Chemical Engineering Vol 6, by Richardson & Coulson

Pattern of Question Paper:
The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE205 **Fluid Mechanics**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop Logical understanding of the subject
2) To understand fundamental calculations and principles related to fluid flow in chemical processes.
3) To produce graduates with knowledge of dynamics of fluid flow.

Unit 1: Fluid Statics: Nature and properties of fluids, static fluid properties, hydrostatic equation, barometric equation, hydrostatic equation in centrifugal fields, hydrostatic forces on plane and curved surfaces, Buoyancy. Measurement of fluid pressure – manometers, Fluid flow phenomenon : Types of fluid flow – shear stress and shear rate fields, viscosity and momentum flux. Viscosity of gases and liquids, eddy viscosity. **(08 Hrs)**

Unit 2: Flow of compressible fluids: Continuity equation, Total energy balance equation, mechanical energy balance equation, Ideal gas equation, Velocity of sound, Sonic velocity, Mach Number **(04Hrs)** .

Unit 3: Basic equations of fluid flow: Basic equations of incompressible flow- conservation of mass momentum and energy. Turbulence and nature of turbulence, Reynolds number, flow in boundary layers. Boundary layer formation in straight tubes/ pipes, Boundary layer separation & wake formation. One-dimensional flow, Euler's equation and Bernoulli equation. Application of basic equations of fluid flow. **(08Hrs)**

Unit 4: Flow of fluids: Flow of incompressible fluids through circular conduits, shear stress distribution, and relation between skin friction and wall shear. The friction factor, relation between skin friction parameters, laminar flow in pipes. Laminar and turbulent flow equations – average velocity kinetic, energy correction factor. Hagen – Poiseuille equation. Turbulent flow in pipes and closed channel, velocity distribution equation for laminar, sub layer, buffer layer and turbulent core. Maximum and average velocity. Effect of roughness parameter. The friction factor chart (Mood's diagram), friction factor in flow through channels of non-circular cross section, friction from changes in velocity or direction, effect of fittings and valves. Flow through coils. Non –Newtonian fluid flow. **(08 Hrs)**

Unit 5: Flow past immersed bodies: Boundary layer formation -Laminar and turbulent boundary layers. Types of drag, drag coefficient and stream lining. Flow through solids, Ergun's equation, Kozney- Carmen equation, Blake Plummer equation. Mechanism of fluidization, types of fluidization, minimum fluidization velocity. Applications of fluidization , Motion of particles through fluids- free and hindered settling. Measurement of fluid flow by pitot tube, orifice meter, venturimeter, rotameter.**(06 Hrs)**

Unit 6: Fluid flow machinery : Developed head, power requirement, suction lift & cavitation, NPSH. Pumps & Compressors for chemical plants- reciprocating, rotary, centrifugal, airlift pumps, blowers (their performance & characteristics. Pipeline in series and parallel flow problems. **(06 Hrs)**

Reference Books

1. Unit operations in Chemical Engineering by McCabe W L & Smith J C McGraw Hill Co.

2 Chemical Engineering Vol I by Richardson & Coulson

'3 Fluid and Particle mechanics by Michele S J

4 Fluid Mechanics by A K Jain Khanna Publication

Pattern of Question Paper:

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:BSH221 **LAB-I Engineering Chemistry**

Teaching Scheme
Practical: 4 hours/week

Examination Scheme
Practical Examination: 50 marks

Practical Work

Minimum ten experiments, based on the syllabus, should be conducted during the course and record (Journal) for the same shall be submitted.

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Suggested List of Experiments: The experiment be based on following list:

1. Identification of organic compounds based on functional group analysis. Physical constants and derivatives. (at least 4 compounds)

2. Preparation of organic compounds (any three)
   a) Preparation of acetanilide from aniline.
   b) Preparation of meta-dinitrobenzene from benzene.
   c) Preparation of iodoform from acetone.
   d) Preparation of benzoic acid from benzaldehyde.
   e) Preparation of aspirin form salicylic acid.
3. Estimation of following compounds (any three)

   a) Carboxylic acid by titration method. Acetic acid.

   b) Phenol by bromination.

   c) Glucose by iodiometry method.

   d) Esters by hydrolysis (ethyl acetate)

   e) Aniline by bromination

   f) Amide by hydrolysis (amide group) (acetamide)

Code No:BSH222 **LAB-II Physical Chemistry and Thermodynamics**

Teaching Scheme
Practical: 4 hours/week

Examination Scheme
Practical Examination Marks: 50

Practical Work

Minimum eight experiments, based on the syllabus, should be conducted during the course and record (Journal) for the same shall be submitted.

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Suggested List of Experiments: The experiment be based on following list:

Suggested list of experiments/studies

To determine the viscosity of the liquid,

1. To determine the specific and molecular refractions of unknown liquid by refractrometer.
2. To determine the normality of acetic acid and hydrochloric acid.
3. To determine the dissociation constants of acetic acids by pH meter.
4. To verify the Lambert-Beer law for Potassium dichromate, Potassium per magnet and to prove the principal of additives.
5. To determine the energy of activation of liquid phase reaction.
6. To determine the unknown composition of Acetic acid in three-component system.
7. To determine the red ox potential in Ferrous-ferric system using potentiometer
8. Hydrolysis of ester in presence of hydrochloric acid.
9. Saponification of ester by sodium hydroxide.
10. Determination of rate of reaction in Zero order kinetics.

Code No:CHE223 LAB-III Fluid Mechanics

Teaching Scheme
Practical: 2 hours/week

Examination Scheme
Term-Work Marks: 50

The term work syllabus consist of a record of minimum eight (laboratory experiments) performed & completed during the term

Suggested list of experiments/studies:

1. To perform an experiment on venturimeter.
2. To perform an experiment on orifice meter.
3. To perform an experiment on flow of water through pipe.
4. To perform an experiment on flow of water through helical coil.
5. To perform an experiment on flow of water through spiral coil
6. To study the characteristics of centrifugal pump.
7. To study the characteristics of reciprocating pump.
8. To determine reflux time of a tank and funnel.
9. To study the velocity profile of fluid in pipe/duct.
10. To study flow of fluid through packed bed.
11. To study flow of fluid through fluidized bed.
12. Determination of viscosity
13. Verification of Bernoulli's theorem

Code No:CHE224 LAB-IV Theory and Drawing of Equipment

Teaching Scheme
Practical: 4 hours/week

Examination Scheme
Practical Examination Marks: 50
Term-Work Marks: 50

Note:

1. The theoretical concepts and design in this subject is to be taught in the practical class.
2. The practical classes are to be conducted in a drawing hall.
3. The duration for each batch of students attending the practical class is 04 (four) hours, out of which 01(one) hour is to be spent on teaching the theoretical concepts and 03 (three) hours are to be given to the students to complete the drawings on a drawing sheet.
4. Along with the theory & design, drawing of simple parts of machines and ability of supply additional views is expected.
5. Stress should be given with reference to chemical industry applications.

Practical : Total five sheets should be completed based on the following topics.

1. Standard equipment symbol
2. Standard instrumentation symbol
3. Process flow-sheet based on 1.and 2.
4. Pipe joints and pipe fittings.
5. Types of valves – Gate valve, Globe valve, etc.
6. Types of Joints
7. Types of threads and fastenings
8. Keys and Coupling

The practical examination shall consist of a viva-voce based on theory and drawing work done during the course and on the syllabus.

Code No:BSH201 **Engineering Mathematics-IV**

Teaching Scheme
Theory: 4 hours/week
Tutorial: 1 hours/week/Batch of 30 Students

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop Logical understanding of the subject
2) To develop mathematical skill so that students are able to apply mathematical methods & Principal's in solving problems from Engineering fields
3) To produce graduates with mathematical knowledge & computational skill.

Unit 1: Function of complex variable (Differential calculus): Introduction, Analytic function Cauchy Riemann equations in Cartesian and Polar form, Harmonic function, Taylor's series &, Laurent's series (without proof), Conformal mapping (geometrical representation of function of complex variable), bilinear transformation. (7)

Unit 2: Function of complex variable: (Integral calculus): Line integral, contour integral: Cauchy's integral theorem, Cauchy's integral formula (without proof), Residues, Cauchy's residue theorem, Integration along unit circle and along upper half of semi circle. (7)

Unit 3: Application of PDE: solutions of partial differential equation by method of separations of variables, Application to vibration of string, one dimensional heat flow equations, Laplace equation in two dimensions with boundary conditions. (6)

Unit 4: Laplace transform: Definition, Transforms of elementary functions, Properties & theorems of Laplace transforms(without proof), transforms of periodic function, Heaviside unit step function, displaced unit step function, Dirac delta function, error function, Bessel' function of zero order. (6)

Unit 5: Inverse Laplace transform and its applications : Inverse Laplace transforms by using i) properties, ii) partial fractions, iii) Convolution theorem, Applications to solve linear differential equations with constant coefficients (Initial value problems), Simultaneous Linear differential equations . (6)

Unit 6: Fourier Transform and its applications: Fourier integral, Fourier sine and cosine integral, complex form of Fourier integral, Fourier transforms Fourier sine and cosine transform and inverse Fourier transforms Finite Fourier sine and cosine transforms. Solution of one dimensional heat equation by using Fourier transform. (8)

Note: All Theorems are without proofs
Section A: Unit 1, 2, 3
Section B: Unit 4, 5, 6

Reference Books:
1. **A Text Book of Engineering Mathematics (Volume-I, II,III)** by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2. **Higher Engineering Mathematics** by B. S. Grewal, Khanna Publications, New Delhi.
3. **Advanced Engineering Mathematics** by H.K. Das, S. Chand & Company.
4. **Higher Engineering Mathematics** by B.V. Ramana (Tata McGraw-Hill).
5. **Advanced Engineering Mathematics** by Erwin Kreyszig, Wiley Eastern Ltd.
6. **Engineering Mathematics A Tutorial Approach** by Ravish R Singh, Mukul Bhat ,Mc Graw Hill

Pattern of Question Paper:
The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE252 **Heat Transfer**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop understanding of the principles and modes of heat transfer.
2) To understand calculations and principles related to heat transfer in chemical processes.

Unit 1: Heat Transfer Media and Conduction:

Heat Transfer Media: Characteristic properties, classification, selection and application. Nature of heat flow, modes of heat transfer, Fourier's Law, steady state and unsteady state conduction in plane wall, cylindrical wall, spherical wall, multilayer walls, lumped parameter analysis, transient heat flow in a semi-infinite solid. (06 Hrs)

Unit 2: Insulation, Fins and Heat Transfer Augmentation:

Thermal insulation, types and selection, optimum and economic thickness of insulation for high and low temperatures. Heat transfer in extended surfaces ,effectiveness of fins, areas of application. Heat transfer by convection, concept, of film and overall heat transfer coefficient, resistance concept, coefficients for scale deposits, Augmentation Techniques.

(08Hrs)

Unit 3: Convection:

Convective heat transfer for flow through and outside pipes, laminar heat transfer on a flat plate, dimensionless numbers in heat transfer. Dittus-Boltzer Equation, Sieder-Tate Equation, Colburn Equation. Natural convection, fluid flow and heat transfer across cylinders and spheres. (06 Hrs)

Unit 4: Convection with Phase Change and Analogy:

Heat transfer with phase change, heat transfer in boiling liquids and condensation of vapors. Reynolds Analogy between Heat Transfer and Momentum Transfer, Colburn's Analogy in convective flow. Heat Transfer in Packed Bed and Fluidized Bed Systems. (06 Hrs)

Unit 5: Radiation:

Heat transfer by radiation, Absorptivity, Reflectivity, Transimitivity, Kickoff's Law, Stefan Boatman's Law, Black and Gray body radiations, Opaque Body, view factors, radiant heat exchange between non-black surfaces. Radiation between different surfaces, radiation shield , radiation from flames and gases. Combined heat transfer by conduction-convection and radiation. (06 Hrs)

Unit 6: Heat Transfer Equipment:

Heat transfer equipments, double pipe heat exchangers, single and multi-pass shell and tube heat exchangers, LMTD and effectiveness-NTU method. Spiral coil and plate type heat exchangers, heat transfer in evaporators – single and multiple effects, heat transfer in agitated vessels, coils, jacketed vessels, transient heating and cooling, Heat pipe (08 Hrs)

Reference Books:

1. Unit Operations of Chemical Engineering, W. L. McCabe & J.M. Smith, et al McGraw Hill Publication.
2. Process Heat Transfer, D. Q. Kern McGraw Hill Publication.
3. Chemical Engineering Vol.-I J. F. Richardson J. M. Coulson, Pergamon Press Publication.
4. Heat Transfer by J P Holman, McGraw Hill Publication.
5. Fundamentals of Heat Transfer F. Krieth, M. S. Bohn et al Harper & Row Publishers, New York.
6. Heat Transmission W. H. Mc Adams McGraw Hill Publication.
7. Engineering Heat Transfer Gupta and Prakash .
8. Heat and Mass Transfer: Fundamentals & Applications by Yunus Cengel, McGraw Hill Publication

Pattern of Question Paper:

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE253 **Mechanical Operations**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop understanding of the principles of unit operations .
2) To understand calculations and principles related to chemical processes.

Unit I: Size Reduction:

Law of Size reduction, types of equipment used and their selection. Open and Closed Circuit Operation, Crushers, Ball Mill, Rod Mill etc. Energy relationship in size reduction. (06 Hrs)

Unit II : Particle size analysis and Separation:

Methods of representation of size analysis, sub sieve methods of analysis, surface area determination. Theory of screening and size distribution, different type of screening equipments , mesh number, cumulative screening, effectiveness factor, screening effectiveness. (08 Hrs)

Unit III : Storage and Transportation of Solids :

Storage of solids ; Bunkers, Silos, Bins, Hoppers and handling of solids. Transportation of solids, conveying, types of conveyors and performances. (06 Hrs)

Unit IV: Sorting:

Separation of solids, Gravity concentration methods. Jigging, Principles of jigging , types of jiggs , their performances, characteristics. Froth flotation- Principles and Theories of collection, flotation cell, typical circuits, magnetic and electrical separation. (08 Hrs)

Unit V: Solid-Liquid Separation:

Filtration- filtration theory, equipments for filtration, constant pressure and constant rate filtration, optimum cycle, use of filter aids, equipment for liquid solid filtration. Agitated Nutsche filters. Micro and ultra filtration, reverse osmosis. Centrifugal separations - Principle,. Thickening - Batch and Continuous thickeners Classification, types of classifiers, mechanical and non mechanical, pneumatic, Cyclone separation, theory, principle. (10 Hrs)

Unit VI: Mixing :

Mixers & mixing, Agitators & agitation, Flow patters in agitated vessels, flow numbers, power consumption and mixing index. (04 Hrs)

Reference Books:

1. Unit Operations of Chemical Engineering, W. L. McCabe & J.M. Smith, et al McGraw Hill Publication.
2. Chemical Engineering Vol.-I & II, J. F. Richardson J. M. Coulson, Pergamon Press Publication.
3. Introduction to Chemical Engineering, W. L. Badger and J. T. Banchero McGraw Hill Publication.
4. Principles of Unit Operations, A. S. Foust et al John Wiley & Sons Publications.
5. Chemical Engineers Hand book, R. H. Perry, McGraw Hill Publication.
6. Chemical Engineering mechanical operations by Hiramath and A.P. Kulkarni.

Pattern of Question Paper:

The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE254 **Process Instrumentation and Analytical Techniques**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Objectives: 1) To develop understanding of the principles of measurement.
2) To understand the instruments and analytical method using in process industries.

Unit I : Principles of measurement, elements of instruments, static and dynamic characteristics, response of first and second order instruments. Process Instrumentation. Recording, indicating, signaling instruments. Principles of transductions, Transducers & their classification. Elastic, Resistance, Capacitive & Inductive transducers for temperature, level, flow and pressure measurements. Instrumentation diagrams. **(06hrs.)**

UnitII : Constructional details, working principles and response characteristics of, temperature measuring instruments like expansion thermometers, thermocouples,themister, resistance thermometer, pyrometers, etc. **(08hrs.)**

Unit III : Constructional details, working principles and response characteristics of, pressure and vacuum measuring devices (instruments) like pressure gauge, McLeod gauge, etc. Head and Level measuring devices. Review of flow meters (orifice meter, venturi meter, rotameter). **(06hrs.)**

Unit IV : Importance, scope & methods of sampling of solids, liquids, gaseous materials, industrial & laboratory techniques. Tools of the analyst, general procedures, preliminaries to the analyst. Theory of indicators. Gas analysis ,Introduction theory, instrumentation and application of Visible Spectrophotometry, Colorimetry, Infrared Spectroscopy, Conductometry & conductometric titration, Potentiometry. **(08 hrs.)**

Unit V : Introduction theory, instrumentation and application of Flame Photometry, Polarography, Amperometric titration, Coulometric technique & titration. **.(06 hrs.)**

Unit VI : Introduction theory, instrumentation and application of Karl-Fischer titrimetry, Gas chromatography, thin layer chromatography. **(06 hrs)**

Reference Book:

1. Industrial Instrumentation by Donald P. Eckrnan, Wiley Eastern Ltd.
2. Principles of Industrial Instrumentation by D. Patranabis, Tata.-McGraw Hill Co.
3. Instrumental Methods in Chemical Analysis by G.W.Ewing, Mc Graw Hill Co.
4. Instrumental Methods in Chemical Analysis by Chatwal and Anand.
5. Instrumental Methods in Chemical Analysis by B.K.Sharma
6. Quantitative Inorganic Analysis by A. I. Vogel

Pattern of Question Paper:
The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CED255 **Strength of Material**

Teaching Scheme
Theory: 4 hours/week

Examination Scheme
Class Test: 20 Marks
Theory examination: Maximum hours: 3 Hrs.
Theory examination: Maximum Marks: 80

Unit 1: Shear force & Bending moment : Relation between load intensity, shear force and bending moment. Shear force & Bending moment diagrams for simply supported, cantilever & overhanging beams with point loads & UDL. Theory of simple bending & bending stress distribution. Shear stresses & shear stress distribution in beam sections **(10Hrs)**

Unit 2: Simple Stresses & Strain : Simple stress & strain due to tension, compression and. shear. Temperature stresses for section of one material & more than one material. **(06 Hrs)**

Unit 3: Principle Stresses & Strain : Principle stresses & planes. Analysis of stresses on different planes in a material, two-dimensional stress system. Mohr's circle diagram for stress. **(04 Hrs.)**

Unit 4: Eccentric Loading : Bending combined with axial loads. Eccentrically loaded short columns & chimneys. Axially loaded long & short columns with different support conditions. Euler's & Ranking's method **(06 Hrs)**

Unit 5: Theory of Torsion : Circular shafts subjected to torque- stress distribution & power transmission. Torsion combined with bending & axial force. Strain Energy : Strain energy due to axial loads, bending, shear, torsion & axial impact load. **(08 Hrs)**

Unit 6: Thin & Thick Cylinders & Spheres : Thin cylinders & spheres subjected to internal fluid pressure. Lame's theory, design of thick cylinders & spheres. **(06 Hrs)**

Reference Books

1 Mechanics of structure vol I by S. B. Junnarkar

2 Strength of materials by Singer F L

3 Strength of materials by Ramamurtham

4 Strength of materials by B C Punmia

5 Elements of strength of materials by Timoshenko & Young

Pattern of Question Paper:
The units in the syllabus shall be divided in two equal sections. Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:
1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory and should have at least ten bits of two marks out of which FIVE to be solved.
4. Two questions from remaining questions from each section be asked to solve having weightage of 15 marks

Code No:CHE271 LAB-V Heat Transfer

Teaching Scheme
Practical: 2 hours/week

Examination Scheme
Practical Examination Marks: 50

Practical Work

Minimum eight experiments, based on the syllabus, should be conducted during the course and record (Journal) for the same shall be submitted.

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva-voce based on the syllabus.

Suggested List of Experiments: The experiment be based on following list:

1. Thermal conductivity of composite wall.
2. Pin fins.
3. Forced convection apparatus.
4. Natural convective apparatus.
5. Emmisivity of test plate.
6. Dropwise and filmwise condensation
6. Stefan Boltzman apparatus.
7. Parallel flow / counter flow heat exchanger.
8. Pool boiling phenomena and critical heat flux.
9. Heat transfer on evaporator.
10. Thermal conductivity of insulating material.
11. Temperature profile in a metal rod.
12. Heat Transfer in Agitated Vessel.
13. Heat Transfer through Shell and Tube heat exchanger.

Code No:CHE272 LAB-VI Mechanical Operations

Teaching Scheme
Practical: 2 hours/week

Examination Scheme
Practical Examination Marks: 50

Practical Work

imum eight experiments, based on the syllabus, should be conducted during the course and record (Journal) for the me shall be submitted.

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments to be submitted by the candidate and viva-voce based on the syllabus.

Suggested List of Experiments: The experiment be based on following list:

1. Sieve analysis.
2. Double deck Vibrating Screen.
3. Jaw crusher.
4. Pulveriser.
5. Ball mill.
6. Plate and frame filter.
7. Vacuum filter.
8. Batch settling.
9. Cyclone Separator.
10. Sigma mixer.

Code No:CHE273 LAB-VII Process Instrumentation and Analytical Techniques

Teaching Scheme
Practical: 2 hours/week

Examination Scheme
Term-Work Marks: 50

Term Work:

Term work shall consist of a Journal containing record of any eight experiments, at least four from each section, performed from the following list of suggested experiments:

Section-A

1. Characteristics of thermocouple
2. Calculation of time constant of thermometer.
3. Characteristics of thermister
4. Characteristics of Resistance Temperature Detector.
5. Calculation of time constant of single liquid level tank.
6. Characteristic of Pressure gauge.

Section-B

1. Detennination of iron/ nickel spectrophotometrically.
2. Determination of sodium / calcium / potassium by flame photometer. ,
3. Determination of KMnO4 or acetic acid potentiometrically.
4. Identification and quantification of cadmium in a mixture by polarigraphy.
5. Separation of some amines by TLC or paper chromatography.
6. Identification and quantification of an organic compound by gas chromatography.
7. Determination of moisture content by Karl-fisher apparatus.
8. Determination of percentage of sugar / camphor / lactic acid in a solution by polarometer.
9. Analysis of fertilizer / drugs / milk by colorimeter.

Code No:CHE274 LAB-VIII: Computer Laboratories

Teaching Scheme	Examination Scheme
Practical: 2 hours/week	Practical Examinations Marks: 50

Term work shall consist of a record of minimum eight executable programming assignments using C or C++ language dedicated to "Applications in Chemical Engineering" and based on following numerical techniques.

1. Root finding methods (bisection, secant, regular-false, Newton Raphson), for algebraic and transcendental equations.
2. Interpolation and extrapolation.
3. Numerical Integration and differentiation.
4. Curve fitting.
5. Matrix operations (Addition, subtraction, multiplication, inverse) for solution of simultaneous linear algebraic equation arising in chemical engineering.

Emphasis is to be given on numerical techniques. Students should be made aware of advantages and disadvantages of One method over other, wherever possible.
The term work will be a continuous assessment based on: 1. Program compiled by the student in the computer laboratory. 2. The record of the experiments submitted by the student. 3. An oral examination / viva-voce (conducted internally) on the syllabus and the term work mentioned above.

The practical examination shall consist of a viva-voce based on numerical techniques done during the course and on the syllabus.

Reference Books

For Numerical Methods:

1. Computer oriented numerical methods by Rajaraman V.
2. Numerical methods by Balchandra R.S.
3. Numerical methods with C++ programming by Somasundaram R.M.
4. Numerical methods for Engineering problems by Krishna R.N.
5. Lean Lapidus. "Digital Computation for Chemical Engineers". McGraw Hill Publication, 1962. .

For C Programming:

1. Let us C by Yeshwant Kanitkar
2. The C programming language by Karnighan B.W.
3. Programming in C by Stepken G. Kochan

For C++ Programming:

1. The complete reference in C++ 3rd edition by Herbert Schidlt, Tata McGraw hill.
2. Object oriented programming in turbo C++ by Robert Lafore.

Code No:BSH275 LAB-IX: Communication Skills

Teaching Scheme	Examination Scheme
Practical: 2 hours/week	Term-Work Marks: 50

Unit I : Grammar and Usage — 7 Hrs
- Overview of basic Mid-level English Grammar.
- Parts of Speech
- Prepositions and Conditionals.
- Tense and concept of time.
- Sentence Construction (Concord).
- Vocabulary: Words, Idioms, Phrases, Antonyms and Synonyms.

Unit II: Speaking Skills — 5 Hrs
- Training in Sound Recognition
- Stress and Intonation pattern in spoken communication
- Rhythm and effective English communication
- Sound Recognition Exercise (Language Lab Exercise).
- Common Errors in English.

Unit III: Listening and Reading Skills — 3 Hrs
- Active and Passive Listening.
- Note taking tips
- Techniques of reading
- Types and Techniques – skimming and scanning of reading

Unit IV: Writing Skills — 5 Hrs
- Identification of different writing styles (Four Writing Styles).
- Business Letters
- E-mail Writing
- Report Writing
- Job Applications
- Resume Preparation
- Drafting: Memo, Circulars, Notices, Agendas etc.

Term Work: The Term Work consists of 10 Experiments from the above said syllabus.

Texts:
1. Farhathullah, T. M. Communication Skills for Technical Students. Kolkata: Orient Blackswan (2008).
2. Bansal R.K. and J. B. Harrison. Spoken English. Chennai: Orient Longman Ltd. (1997).
3. A. V. Martinet and A. J. Thomson. A Practical English Grammar. Oxford: University Press (1986).

References:
1. Murphy, Raymond. Essential English Grammar. Cambridge: University Press (2000).
2. Hewings, Martin. Advanced English Grammar. Cambridge: University Press (2003).
3. Apte, Madhavi. A Course in English Communication. New Delhi: Prentice Hall of India Pvt. (2008).

Web Links:
- http://www.bmconsultantsindia.com/advanced-english-speaking.html
- http://englishtrainer.blogspot.in
- http://www.englishclub.com/learn-english/language-skills.htm