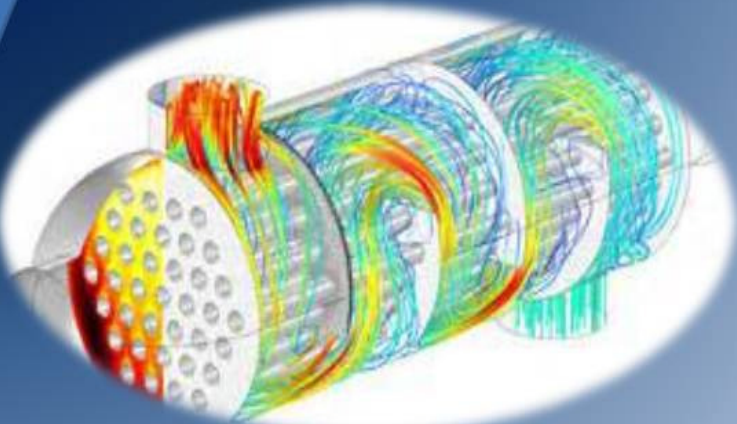# School of Engineering and Technology
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE UNIVERSITIES ACT, 2009)
BILASPUR(C.G.)

STUDENT'S HANDBOOK
2014-15
Bachelor of Technology Programme
Department of Chemical Engineering

Personal Details

Name   : --
Father's Name   : --
Mother's Name   : --
Date of Birth   : --
Address   : --

Phone   : --
Mobile   : --
e-mail   : --
Local Guardian's
Name (if any) : ---
In Case of emergency
Please contact   : --

Phone   : --
Mobile   : ---
Blood Group   : --
Driving License
Number   :---
Other Information   :--

Chemical Engineering Student's Handbook

INSTITUTE OF TECHNOLOGY,

GURUGHASIDAS VISHWAVIDYALAYA,

(A Central University)

BILASPUR, C.G. 495009

Preface

The Institute of Technology under Guru Ghasidas Vishwavidyalaya (now a Central University since 15th Jan., 2009), Bilaspur (C.G.), was set up in the year 1997 with an objective of making available the facilities of quality higher education in the field of Engineering and Technology to the students of, particularly, the Central region of the country where the rural and tribal population still remains deprived of such facilities. The Institute, remaining fully conscious of its objectives and responsibilities, is growing towards the level of a centre of excellence for quality engineering education in the country. Especially, after up-gradation of the University as a Central University, there has been many fold enhancements in infrastructural facilities as well as faculty and staff. Today, the Institute has well equipped laboratories with latest equipments, a good library, adequate computational facilities and smart E-classrooms needed for ensuring quality in technical education and research. The mission of the Institute is to create an ambiance in which new ideas, research and scholarship flourish to produce leaders and innovators of tomorrow.

The University campus houses faculties like Arts, Science, Social Science, Humanities, Law and Management etc. Our students get opportunities of studying varied nature of elective courses from other faculties, and are groomed to work not only with a group of technically trained people but also with persons having knowledge in different domains of education.

The Institute on an average, admits around 400 students annually for the 4 - year undergraduate B. Tech programme in seven branches. Admissions are made through Joint Entrance Examination (JEE) (main) or the entrance examination conducted as per the directions of MHRD, Govt. of India. Presently, M.Tech. Programme is being run by two departments (Mechanical and Chemical Engineering) and students who are Graduate Aptitude Test in Engineering (GATE) qualified get admitted. To keep pace with new developments and changes in the field of technology, the Institute revises its Undergraduate and Postgraduate Programmes syllabi from time to time. Institute follows semester system of teaching (odd semester: July - December; and even semester: January – June).

Ours is a student-centric Institution and, therefore, the endeavor is always to ensure that students are offered the quality and value based education and training so as to create not only outstanding scientists and engineers but also good citizens.

This booklet contains comprehensive information on the existing Rules and Regulations governing the B.Tech. Programmes. The students and parents/ guardians are, therefore, advised in their own interest to get fully familiar with the academic system of the Institute and rules and regulations. Students' attention is particularly drawn to the attendance requirement, regular assessment procedures, conditions of promotion to higher semesters and grading system, etc.

Thank you for your interest in the Institute of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur. We wish all our students a very bright future and successful career.

Dean (SOS, Engg. & Tech.)

Introduction:

Guru Ghasidas Vishwavidyalaya (GGV), a Central University established by an Act 2009 of the Parliament, was originally established as a State University by an Act of State Legislative Assembly of the then undivided Madhya Pradesh on 16 June 1983. GGV is an active member of the Association of Indian Universities and Association of Commonwealth Universities. The National Assessment and Accreditation Council (NAAC) has accredited the Universities as B.

Situated in a socially and economically challenged area, the Vishwavidyalaya is appropriately named to honour the great Satnami Saint Guru Ghasidas (born in 17th century), who championed the cause of the downtrodden, and waged a relentless struggle against all forms of social evils and injustice prevailing in the society.

The Vishwavidyalaya is a semi-residential institution. The Vishwavidyalaya covers almost the total spectrum of higher education in 32 numbers of Vishwavidyalaya teaching departments offering various courses in the areas of Arts, Commerce, Education, Engineering and Technology, Humanities, Life Sciences, Management, Pharmacy, Sciences and Social Sciences. The lush green sprawling campus of the Vishwavidyalaya, spread over an area of aprox 655 acres, is located five KM away from the main Bilaspur Town. River Arpa, the lifeline of Bilaspur, runs parallel to the Vishwavidhyalaya campus. Bilaspur is a fast Industrializing City, already having a large number of industrial units coming up in the region. The area is the nerve center of trade in iron and steel, coal, aluminium, textiles, foodgrains, ' Kosa' silk, cement, paper, furniture and jewellery, and is internationally known for its rice production. The Vishwavidyalaya aims at disseminating and advancing knowledge by providing instructional and research facilities in various branches of learning. It promotes innovation in teaching learning process, interdisciplinary studies & research, establishing linkages with industries for the promotion of science & technology, educate and train man-power for the development of the country and is committed to the improvement of the social, and economic conditions of the people by educating them and helping in their intellectual, academic and cultural development.

The city is well connected with all parts of the country by road and rail. Being a railway zone, Bilaspur facilitates travel by train to and from any part of the country. 120 Kilometers away, at Raipur, the Capital of Chhattisgarh, is the nearest airport.

Institute of Technology:

The Institute of Technology is a prestigious institute of higher learning producing meritorious students with excellent career growth and universal recognition. Our students get the best of opportunities in the form of highly advanced courses, eminent faculty members, well-equipped laboratories, library, hostels and immense facilities to excel in research and development. The selection procedure for students at undergraduate and postgraduate is highly competitive and we get the mst talented and bright students from all over the country. Highly scientific and innovative technology is used for teaching and carrying out

research activities.Every year institute adds to its credibility and national/international visibility by the laurels brought by its students and faculty in the form of research publications, projects, fellowships and industrial linkage.

The Institute awards Bachelors and Masters Degrees in various branches of technology. It has been making special efforts to recruit talented faculty on a world-wide basis. Bright young students are admitted from all over the country by a careful selection process through Central Counseling Board (CCB), Government of India based upon AIEEE merit. The Institute has about 1600 undergraduate students. We have one of the finest technological libraries with complete information retrieval system.

The Institute has well established Training & Placement Cell which provides the necessary facilities to the students for their placements. The Training & Placement Cell of the Institute will strive to develop itself as one of the best placement centre in our country.

The Institute of Technology is poised to reach heights with its quality research, training, collaborations, and projects. It has signed MOUs with some reputed organizations like IBM and IIT Kanpur. The faculty is also involved in research and development and has a number of publications to their credit, and some are under process. Our Institute of produces career ready graduates who are readily employable.

Department of Chemical Engineering

The Chemical Engineering Department is one of the premier and oldest department of Institute of Technology. The department was established in 1997 with a vision to establish itself as one of the best study centre of Chemical Engineering with a focus on cutting edge technology research and to produce career ready chemical engineers. The department offers B.Tech. and M.Tech. course in chemical engineering with intake capacity of 60 and 18 respectively. Only the GATE qualified candidates are eligible for admission in M.Tech. The course curriculum has been developed at the level of the premier technical institute like IIT/NIT by keeping in view the current trends in chemical industries.

The department is endowed with well qualified faculty members strongly committed to impart high quality teaching in chemical engineering. More than 80 papers have been published in Journals/ International / National Conferences / Seminars and 3 text books have been written by the faculty members. It has well equipped laboratories in core and specialised areas of chemical engineering. The department has received the total research grant of Rs. 41 Lakhs by funding agencies like AICTE and UGC.

The department has established student's society - Chemical Engineering Students Society (ChESS), in the year 2011. The objective of the society is to provide a platform to students to enhance their skills and overall personality. "ChESS" has recently started its own book club and is going to launch its e-magazine RaSAYAN, (an in-house publication of ChESS). Department encourages UG students to actively participate in research and present their work in scientific platforms.

More than 50% students of the last batch have been placed in various reputed companies through campus placement. The student of the department have actively participated and

secured appreciable position in various extra and co-curricular activities at the university as well as national and international level.

Alumni list includes people from DuPont, Reliance, ESSAR Oil, GACL, SAHARA (UAE), Jindal, BALCO, HDFC and many reputed organizations

Achievements of Students in last years

- 15 students, qualified in GATE-2014 examination
- 02 students cleared CAT- 2014 examination
- Dimasha Brahma represented the university at Inter University (East Zone) National level Basketball competition organized at University of Kalyani, session 2012-13.
- Vikas Dhanuka got 1stprize on Poster presentation at International Conference at Mumbai

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ORDINANCE – 12

AMENDED ORDINANCE

GOVERNING THE AWARD FOR THE DEGREE OF

BACHELOR OF TECHNOLOGY

(B. TECH. - 4 YEARS (8 SEMESTERS) DEGREE COURSE)

IN THE SCHOOL OF STUDIES, ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
[EFFECTIVE FROM SESSION 2013-14]

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1.0 GENERAL

The first degree of four years (Eight Semester) Course in Technology, hereinafter called 4-year B.Tech degree course, shall be designated as 'BACHELOR OF TECHNOLOGY' in respective Branches. The conduct of the programme and the performance evaluation of B. Tech. courses are on the basis of percentage of marks earned as well as credit system.

2.0 ADMISSION

The minimum qualification for admission to the first year B. Tech. shall be the passing of Higher Secondary School Certificate Examination (10+2) scheme with Physics, Chemistry and Mathematics conducted by Central Board of Secondary Education or any other equivalent examination from recognized Board or University. The candidate shall be eligible for admission on the basis of the merit list of Joint Entrance Examination (JEE) (main) or any other entrance examination decided by Guru Ghasidas Vishwavidyalaya for Admission to B. Tech. degree course time to time. In general the admission to B. Tech. degree course shall be governed by the rules of, MHRD, Govt. of India and Guru Ghasidas Vishwavidyalaya.

3.0   ATTENDANCE REQUIREMENT (as per UGC Model Ordinance)

3.1   A Student shall be required to attend at least 75% of the classes actually held in the semester which may include theory class, seminars, sessionals/ practicals, as may be prescribed.

Provided that the Dean of the School concerned on the recommendations of the Head of the Department may condone the shortage in attendance not exceeding 5% for valid and convincing reasons.

Provided, further that students representing the Institute/University in the extra co-curricular events be given a extra concession up to 5% attendance, if necessary, in addition to the relaxation in the attendance requirement as provided above. Such concessions would be available for the days of actual participation in the event, including journey time, with the prior approval of the Dean of the Students Welfare.

3.2   A student who does not satisfy the requirement of attendance as per clause 3.1, he/she will be detained due to shortage of attendance in a particular semester and he/she will have to repeat the same semester taking re-admission as a regular student in the next commencing academic session.

4.0 DURATION

The duration of undergraduate (U.G.) degree programmes leading to B. Tech. degree, shall be normally four years and the maximum duration shall be six years from the date of initial registration in First year B.Tech. course. If a candidate will not be able to complete the course in the maximum duration of 6 years then he / she will not be eligible to continue the course from that point of time itself

5.0 EXTRA ORDINARY LONG ABSENCE

If a student does not participate in the academic activities of the School of Studies of Engineering and Technology of this Vishwavidyalaya for a period exceeding two years he / she shall neither be permitted to appear in any subsequent examinations nor shall be admitted or promoted to any semester and he / she shall cease to be a student of B. Tech. Degree Course. Here participation in academic activity means attending Lectures, Tutorials, Practicals/Sessionals and such other activities declared as academic activities.

6.0 EXAMINATIONS

6.1   *Medium of Instruction/Examination* – Medium of instruction and examination shall be English only.

6.2   *Practical/ Sessional Work* – The student shall be required to complete the Laboratory / Drawing / Design / Job preparation and other academic work assigned for that semester in the session.

6.3   There shall be a full End Semester Examination at the end of each semester consisting of theory papers, practicals/ sessionals.

6.4 *Preparation Leave* – A preparation leave, as decided by the University time to time shall precede the End Semester (Main) Examination of each semester.

6.5 There shall be one End Semester Examination (ESE) at the end of each semester conducted by Guru Ghasidas Vishwavidyalaya. Only those students, who will satisfy the attendance requirement to be eligible to appear at the End Semester Examination as per clause 3.0, will be permitted to appear in the End Semester Examination. The examination will consist of theory papers, laboratory practical/sessional and viva-voce as per the scheme of examination of that semester. These examinations shall be designated as follows.

a. During First year - I & II sem. B. Tech. Examination

b. During Second year- III & IV sem. B. Tech Examination

c. During Third year - V & VI sem. B. Tech. Examination

d. During Fourth year - VII & VIII sem. B. Tech. Examination

6.6 The semester examination will normally be held in the month of November-December and April – May in every academic session, or as decided by the University time to time.

6.7 Supplementary examination will be held only once in a year (for both even and odd semesters) normally in the month of July/August, or as decided by the University time to time.

6.8 End Semester Examination time table shall be declared by the Controller of Examination before the commencement of examination.

7.0 PASSING OF EXAMINATION

7.1 *Basis of Subjects Evaluation*

7.1.1 For passing in a subject (theory / practical/sessional) the performance of the candidate in each semester shall be evaluated subject wise. There shall be continuous assessment throughout the semester by conducting quizzes / class tests/assignments/seminar, etc. and mid semester examination, called as Internal Assessment (I.A.) carrying 40% weightage, and End Semester Examination (E.S.E.) carrying 60% weightage. For each practical/sessional subject 60% weightage will be given to the actual practicals/sessionals performed during the semester I.A. and 40% weightage will be given to the End Semester Examination (E.S.E.).

7.1.2 For evaluation of end semester practical/sessional examination of a subject, there shall be a panel of three examiners appointed by Head of the Department. All the three

examiners shall be internal from the concerned department of the Institute of Technology, or external examiners may also be appointed.

7.1.3   To allot the marks of Internal Assessment (I.A.), there will be one Mid Semester Examination (M.S.E.) in each theory subject of that semester, apart from Class Tests (CT) and Assignments.

7.2   *Passing Marks in a Subject*

For passing a subject the student is required to fulfill the following conditions:

(a)   Must have appeared at the End Semester Examinations of that subject.

(b)   Must have secured minimum 40% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each theory subject.

(c)   Must have secured minimum 50% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each practical/sessional subject.

(d)   Must have scored minimum total aggregate of 45% marks in the semester.

(e)   If a student has cleared all the Theory and Practical/Sessional subjects of a semester, but has failed to secure overall 45% aggregate in the semester then he/she will be allowed to re-appear in theory supplementary Examination in those subjects in which the student's score is less than 45%.

(f)   If a student has passed a semester examination in all the subjects as per clause 7.2 (a-d), he/she shall not be permitted to reappear in that examination for improvement in grades/division.

7.3   *Basis of Credits*

Credit of a theory or practical/sessional subject is decided by:

Credit = {L+ (T+P)/2}, where L = Lecture periods per week, T = Tutorial period per week, P = Practical/Sessional periods per week. Credit in a subject will be an integer, not in a fractional number. If a credit in a subject turns out in fraction, it will be taken as next integer number.

8.0 ASSESSMENT AND GRADING

8.1 Mode of Assessment and Evaluation

8.1.1 For Theory Subjects

For the assessment of performance of students in a semester, continuous evaluation system will be followed with two components : Internal Assessment (IA), carrying 40% weightage and End Semester Examination. (ESE), carrying 60% weightage. There will be at least two class tests and one mid semester examination in each theory subject in a semester forming

the part of Internal Assessment (IA). Evaluation in End Semester Examination shall be done internally.

8.1.2 For Practical/ Sessional Subjects

Evaluation of practical/sessional during the semester will form 60% weightage and the End Semester Examination (ESE) will carry 40% weightage.

8.2   Grading System

Percentage as well as absolute grading system will be followed, in every subject, theory or practical/sessional. A student will be awarded a **Letter Grade**, based on his combined performance of Internal Assessment (IA) and End Semester Examination (ESE). These grades will be described by letters indicating a qualitative assessment of the student's performance through a number equivalent called "Grade Point" (GP) as given below. The following is the **Grade Point** pattern. Grade 'F' indicates not clearing (passing) of the subject.

Letter Grade (LG)	A+	A	B+	B	C+	C	F
Grade Point	10	9	8	7	6	5	0

Grades will be awarded for every theory and practical/sessional subject separately.

8.3   Absolute Grading System

The Absolute Grading System as explained below will be adopted for theory and practical/sessional subjects.

GRADE	THEORY	PRACTICAL/SESSIONAL
A^+	90 ≤ Marks ≤ 100%,	90 ≤ Marks ≤ 100%,
A	80 ≤ Marks < 90%,	82 ≤ Marks < 90%,
B^+	70 ≤ Marks < 80%,	74 ≤ Marks < 82%,
B	60 ≤ Marks < 70%,	66 ≤ Marks < 74%,
C^+	50 ≤ Marks < 60%,	58 ≤ Marks < 66%,
C	40 ≤ Marks < 50%,	50 ≤ Marks < 58%,
F	0 ≤ Marks < 40%,	0 ≤ Marks < 50%,

8.4 Semester Performance Index (SPI)

Performance of a student in i^{th} semester is expressed by $[SPI]_i$ which is a weighted average of course grade points obtained by a student in the semester, and is expressed by

$$[SPI]_i = \frac{[C_1 G_1 + C_2 G_2 + ...]_i}{[C_1 + C_2 + ...]_i} = \frac{\left[\sum C_j G_j\right]_i}{\left[\sum C_j\right]_i} = \frac{N_i}{D_i}$$

Where C_j stands for Credit and G_j stands for Grade points corresponding to j^{th} subject in a semester. SPIs will be calculated up to two places of decimal without rounding off. SPI will be calculated only when a student clears a semester without failing in any subject, theory or practical/sessional.

8.5   *Cumulative Performance Index (CPI)*

This is a weighted average of course grade points obtained by a student for all the courses taken, since his / her admission to the degree program with 50% weightage of I and II semester marks and 100% for the remaining semesters. Thus, CPI in the ith semester with "i" greater than 2 will be calculated as follows

$$[CPI]_i = \frac{0.5[N_1 + N_2] + \sum_{k=3}^{k=i} N_k}{0.5[D_1 + D_2] + \sum_{k=3}^{k=i} D_k}$$

If a student repeats a course or is declared fail in a subject, then only the grade points earned in the attempt when he / she cleared the course / subject are counted towards CPI. CPI will be calculated in every semester along with SPI, so that a student knows his / her latest CPI.

8.6   Award of Class or Division

8.6.1   The class/division awarded to a student with B. Tech. Degree shall be determined by the student's CPI after clearing all the subjects of all the eight semesters, as given below:

- First Division with Distinction or **Honours**   : $7.5 \le CPI \le 10.0$
- First Division   : $6.5 \le CPI < 7.5$
- Second Division   : $5.0 \le CPI < 6.5$

8.6.2   Division shall be awarded to a student only after clearing all the eight semesters successfully, and having earned a total credit of **208** for the award of B.Tech. degree. It shall

be based on the integrated performance of the candidate for all the eight semesters as per clause 8.6.

8.6.3   No student shall be declared to have passed the final B.Tech. course unless he/she has fully passed all the eight semesters. The results of the eighth semester of those students, who have not passed examination in any previous semester, will be withheld. Such students shall be deemed to have passed the final B.Tech. examination in the year in which they pass / clear all the subjects of all the eight semesters, within the limit of the prescribed period of the whole course.

8.7   Conversion of CPI / SPI in Percentage

Percentage of particular semester   = SPI × 10

Percentage of B.Tech. Degree   = CPI × 10

9.0   PROMOTION TO HIGHER PART (YEAR) AND HIGHER SEMESTER

9.1   Those students who have cleared all the theory, practical/sessional subjects prescribed for the odd semester of that part (Year) shall be promoted to the next higher (even) semester of the same part (year). Here, Part – I, Part-II Part-III and Part-IV mean First year, Second year, Third year, and Fourth year respectively during the B.Tech. programme.

9.2   Those students who have not cleared all the theory, practical/sessional subjects prescribed for the odd semester, for such students to be promoted from odd to the next higher even semester of the same part (year), they will have to pass at least N/2 number of subjects (theory, practical/ sessional) where N is even number of total subjects (theory, practical/sessional) prescribed for that odd semester,   and (N+1)/2 number of subjects (theory, practical/ sessional) where N is odd number of total subjects (theory, practical/ sessional) prescribed in that odd semester.

9.3   Supplementary examinations will be held only once in a year (for both even and odd semesters) normally in the month of July/August after declaration of results of even semester examination of the incumbent session, or as decided by the University time to time.

9.4   Those students who would have backlogs in theory and/ or practical/ sessional subjects in the odd and or even semesters of any part (year) will be allowed to appear in the supplementary examination of the same part (year) only once (one time).

9.5   Those B.Tech. students who are allowed to appear the supplementary examination (of odd or even or both semester)**,** may be provisionally admitted to attend the classes of the next higher odd semester of the next part (year). However, such provisionally admitted

students will become regular only after passing in all their backlog papers in supplementary examination, if eligible otherwise.

9.6   If a student fails to clear in the supplementary examination all the backlogs of theory, practical/sessional subjects of the odd and even semesters, he/she will not be promoted to the odd semester of the next higher part (year), and such student shall be treated as ex-student.

9.7   Ex-students, (as per clause – 9.6), shall be required to clear their backlog papers (theory and or practical/sessional subjects), in the end semester examination of the corresponding semesters (odd and even) to be conducted next year (in the following academic session). Such ex-students will be required to deposit the examination fees only.

9.8   If an ex-student fails to clear all remaining backlogs (theory and practical/sessional subjects) which he/she could not clear as an ex-student in the previous year, he/she will be allowed to appear in the corresponding examination of odd and even semester examinations in the next subsequent year as a last chance. Such ex-students will be required to deposit only examination fees. For example, if a first year student does not clear all the subjects being ex-student in two consecutive years, he/she will be relieved from the programme at the end of the semester. As such, as an ex-student, a student will be allowed to appear in the end semester examination of not more than two academic sessions throughout his/her B.Tech. programme. At any time during his/her B.Tech. programme, if a student has availed two number of attempts for appearing in the end semester examination as an ex-student, for clearing the backlog papers (theory and practical/sessional subjects), he/she will be relieved from the programme at the end of the semester.

9.9   If a student fails to appear in the practical/sessional examination of a semester due to unforeseen incident, a makeup end semester practical/sessional examination may be conducted, if required, strictly on the recommendation of the concerned Head of the Department, and approval of the Dean (Engineering & Technology).

10.0   BRANCH CHANGE AFTER FIRST YEAR RESULT

Starting from the session 2011-12, students admitted in First Year B. Tech. course of the Institute of Technology having CPI of 08 or above at the end of their First Year course, are allowed to change their branch according to merit and subject to the seat availability in the branch where students want to shift. Only those students will be considered for the branch change who would have cleared all the subjects of First and Second semesters in the first attempt itself in the End Semester Examination.

11.0 TRANSCRIPT

Transcript will be provided to the students as per the University norms

12.0 INTERPRETATION

In case of any dispute in the matter of interpretation of this Ordinance, the decision of the Executive Council of the University. shall be final and binding on the students.

13.0 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council of the University has the right to propose any modifications or amendments to the Executive Council for final decision of the above regulations and further actions from time to time.

14.0 Matters not covered in this Ordinance shall be governed by the relevant ordinance of the University.

Scheme & Syllabus

I- SEM. & II-SEM.

(B.Tech.-1stYear)

SCHEMEOF EXAMINATION B.Tech – I Year, Common to All Branches, Course – A, w.e.f. Session: 2012 - 13

S. No.	Subject Code	Subjects	Periods / Week			Percentage Credit of Internal Assesment				% Credit of E.S.E	Grand Total	Total Credit
			L[1]	T[2]	P[3]	M.S.E[4]	C.T[5]	L.A.[6]	Total			
1.	BSH-111	Professional Communication in English	3	1	-	20	20	-	40	60	100	4
2.	BSH-112	Engineering Chemistry	3	1	-	20	20	-	40	60	100	4
3.	ME-113	Engineering Mechanics	3	1	-	20	20	-	40	60	100	4
4.	CSE-114	Introduction to Computer Programming	3	1	-	20	20	-	40	60	100	4
5.	BSH-115	Engineering Maths - I	3	1	-	20	20	-	40	60	100	4
PRACTICAL												
1.	BSH-116	Engineering Chemistry Lab	-	-	3	-	-	30	30	20	50	2
2.	ME-117	Engineering Mechanics Lab	-	-	3	-	-	30	30	20	50	2
3.	ME-118	Engineering Drawing	-	-	3	-	-	30	30	20	50	2
Total Work Load / week : 29			Total Credit : 26				Total Marks : 650					

SCHEMEOF EXAMINATION B.Tech – I Year, Common to All Branches, Course – B, w.e.f. Session: 2012 - 13

S.No.	Subject Code	Subjects	Periods / Week			Percentage Credit of Internal Assesment				% Credit of E.S.E	Grand Total	Total Credit
			L[1]	T[2]	P[3]	M.S.E[4]	C.T[5]	L.A.[6]	Total			
1.	BSH-121	Environmental Studies	3	1	-	20	20	-	40	60	100	4
2.	ME-122	Engineering Thermodynamics	3	1	-	20	20	-	40	60	100	4
3.	BSH-123	Basic Electrical & Electronics Engineering	3	1	-	20	20	-	40	60	100	4
4.	BSH-124	Engineering Physics	3	1	-	20	20	-	40	60	100	4
5.	BSH-125	Engineering Maths – II	3	1	-	20	20	-	40	60	100	4
PRACTICAL												
1.	BSH-126	Basic Electrical & Electronics Engg. Lab	-	-	3	-	-	30	30	20	50	2
2.	BSH-127	Engineering Physics Lab	-	-	3	-	-	30	30	20	50	2
3.	WS-128	Workshop Practice	-	-	3	-	-	30	30	20	50	2
Total Work Load / week : 29			Total Credit : 26				Total Marks : 650					

1: Lectures Hours, 2:Tutorials Hours, 3: Practicals Hours, 4: Mid Semester Exam, 5: Class Tests (Two), 6: Lab Work Assesment

BSH 111 - PROFESSIONAL COMMUNICATION IN ENGLISH

BSH-111	Credits	L	T	P
	4	4	1	0

UNIT-I: Business Communication : Some key concepts; Meaning and process of communication, Types, channels, Medium of Communication, Barriers of communications, Professional communication; types and principles.

UNIT-II: Business Letters; Elements and layout of a business letter, Application, enquiries, calling quotation, sending quotation, orders complains and adjustment.

UNIT-III: Report writing; Technical reports; essentials, characteristics and structure. Observation report survey report, trouble report, project report.

UNIT-IV: Reading comprehension; Developing comprehension skill through reading of passanges, summarizing, précis writing etc.

UNIT-V: Speaking; The process of speaking. Various phonetory orangs. Introduction to phonetics, classification of pure English sounds. Relation between sound, symbol and alphabet.

Suggested Books and References:

1. Communication Skills in English; D'Souza Evnice and Shahani, GNoble Publishing House.

2. Introduction to Communication Studies; Fiske, John, Rotledge London.

3. Business Corres, Pondence and Report Writing; Sharma, R.C. and Mohan,k , Tata Magraw Hill, New Delhi.

4. Model Business Letter; Gartside, Pitman London, 1992.

5. Professional Communication; Chhabra, Dr. T.N., Sun India Publications, New Delhi.

BSH 112 – ENGINEERING CHEMISTRY

3	Credits	L	T	P
	4	3	1	0

[Total 42 h]

Unit – I: Chemical Bonding and Transition Metals   (8h)

VSEPR theory, Valance Bond Theory and Molecular Orbital Theory. Structures of coordination compounds corresponding to coordination numbers up to 6. Geometrical and optical isomerism.

UNIT – II: Structure and Reactivity of Organic Molecules   (8h)

Inductive effect, hyper conjugation, resonance and steric hindrance. Carbocation, carbanion and Free Radicals. Basic concept of nucleophilic & electrophilic-addition, elimination and substitution reactions. Mechanisms of the reactions viz., Aldol condensation, Cannizzaro reaction, Perkin Reaction, Beckmann Rearrangement and Hoffmann rearrangement.

UNIT – III: Reaction Dynamics & Electrochemistry   (8h)

Thermodynamics of chemical process: Concept of entropy, Chemical potential and equilibrium, Dynamics of chemical reactions: order of reactions, chain reactions and photochemical reactions. Basic concept of electrochemistry & corrosion.

UNIT – IV: Polymers and Stereochemistry   (8h)

Basic concepts and types of polymers, mechanism of polymerisation, vulcanisation, natural rubber, Nylon-6, Nylon-6.6., PVC, PET, PS, PE. Stereoregularity in polymers. Conformational analysis (acyclic and cyclic molecules), geometrical and optical isomerism; E, Z and R, S nomenclature.

UNIT – IV: Spectroscopy and Chromatography   (10h)

Theory and application of UV-visible, Infrared and 1H NMR spectroscopy in organic compounds. Wood words-Fieser rule for calculating λmax. Basic concept and application of TLC and column chromatography.

Books recommended:

1. "Stereochemistry conformation and Mechanism";Kalsi, P.S., New Age Int. (P), Ltd. New Delhi, 1997.

2. "Principals of Physical Chemistry"; Puri, B. R. Sharma, L. R. And Pathania, M. S. Shoban Lal Nagin Chand & Co.

3. "Reaction Mechanism in Organic Chemistry" ; Mukherji, S. M. And Singh, S. P., Macmillan India Ltd., New Delhi 2007. Alberty R.A. and Silbey R. J., "Physical Chemistry", John Wiley & Sons, Inc., Singapore, 1996.

4. "Basic Inorganic Chemistry",Cotton F.A., Wilkinson G. and Gaus P.L., John Wiley & Sons, Inc., Singapore, 3rd Ed., 1996.

5. "Fundamentals of Organic Chemistry", Graham-Solomon T.W., John Wiley & Sons, Inc., Singapore, 1997.

6. "Principles of Polymerization", Odian T.W., John Wiley & Sons, Inc., New York, 1981.

7. "A Guidebook to Mechanism of Organic Chemistry" Sykes P., Longman Inc., New York, 1981.

8. "Application of absorption Spectroscopy of Organic Compounds", Dye J.R. r, Prentice Hall of India, 1965.

9. "Spectroscopic Methods in Organic Chemistry", Williams D.H. and Fleming I., Tata McGraw Hill Edition, New Delhi, 4th Ed., 1988.

10. "Physical Chemistry", Atkins P.W., Oxford Univ. Press, 4th Ed., 1990.

11. "Organic Chemistry", Morrison R.T. and Boyd R.N., Prentice Hall of India, 6th Ed., 1992.

12. "Experiments in General Chemistry", Rao C.N.R. and Agarwala U. C., East-West Press, New Delhi, 1969.

ME 113 - ENGINEERING MECHANICS

BSH-113	Credits	L	T	P
	4	3	1	0

UNIT-I: Force, classification of force, laws of the forces, equilibrium, moment, varignon's theorem, parallel force, couple, General case of equilibrium and their problems.

UNIT-II: Trusses – Analysis by methods of joints and methods of sections. Frames – Analysis of frames, difference between truss & frames.

UNIT-III: Friction, law of friction, General problems on friction, wedge friction, Belt friction, Ratio of tension of belt, power transmitted by a belt, Condition of maximum power transmission by belt. Screw friction – Expression for maximum efficiency of a screw jack, and its problems. Simple lifting machine – Velocity Ratio, Mechanical Advantage, Efficiency, reversibility of a machine, wheel and axle, pulley system & its types, single purchase & double purchase winch crab.

UNIT- IV: Centroid and centre of gravity, Methods & procedure of finding C.G by method of

moments and method of integration for various geometrical areas. Moment of Inertia – various theorems on M.I, Radius of gyration, polar M.I, Centroidal axis, Area moment of inertia, product of Inertia & their problems, Introduction of mass moment of inertia.

UNIT-V: Dynamics of body, D 'Alembert's principle, rectilinear motion, work and energy, impulse & momentum and principles of conservation of momentum, collision of elastic bodies.

Recommend Text Books

1. Engineering Mechanics – Beer Johnson, TNH publisher
2. Engineering Mechanics – K.L. Kumar, TMH publisher.
3. Engineering Mechanics - Mokashi, TMH, Publisher
4. Engineering Mechanics – Timoshenko & Young, East West publisher
5. Engineering Mechanics - Irvin Shames, PHI publisher
6. Engineering Mechanics – A.K. Tayal . Umesh publication

CSE 114 - INTRODUCTION TO COMPUTER PROGRAMMING

BSH-114	Credits	L	T	P
	4	3	1	0

UNIT I : Hardware Organization of computer; Introduction of computer, Evolution , types of computer , block diagram of computer , internal architecture of CPU, I/O units (keyboard, monitor, printers etc.) computer memory : primary and secondary memory, cache memory and virtual memory.

UNIT II : Data Representation and system software; Number system, conversion of one number system to another number system.Software, classification of software (application and system software), concept of operating system such as DOS, UNIX, WINDOWS, function of Operating system.Compiler , Interpreter, Assembler and Device drivers.

UNIT III : Introduction to Programming Language; Introduction to software devlopment, Algorithms and its characteristics, Flow chart: symbols, rules for drawing flow charts, decision tables. Origin of C : data type, constants, variables, operators and expressions, operator precedence and associativity rules, header and library files of C.

UNIT IV : Decision making and control statements in C; Decision making and branching : simple if statement, if else statement, nested if--- else statements, switch statements. unconditinal statements : break , continue, goto . Looping : for loop, Do While loop, While loop. Application to simple problems of general nature.

UNIT V : Function and Arrays in C; Function and its pros and cons, function prototype, calling a function, actual and formal arguments ,parameter passing techniques , returning values from function. Arrays: one dimensional and two dimensional arrays. Overview of pointers. Introduction of object oriented programming methodology.

Reference Books:

1. Computer fundamentals by P.K.Sinha
2. Computer fundamentals by B.Ram
3. Fundamentals of Computers by V.Rajaraman
4. Programming in C By E. Balagurusamy
5. Programming in C by Byron Gottfrid.

BSH-115: ENGINEERING MATHS-I

BSH-115	Credits	L	T	P
	4	3	1	0

UNIT-1: Differential Calculus ; Successive Differentiation Leibnitz Theorem, Roll's Theorem, Lagrange's Mean value Theorem, Expansion of functions by Maclaurian and Taylor's series. Tangents and Normal's, Maxima and minima of one van able.

UNIT-II: Indeterminate forms, Asymptotes, Radius of curvature, Partial differentiation, Total differentiation.

UNIT-III: Integral Calculus;   Reduction formulae, Curve Tracing, Length, Area, Surface volume, Theorem of Pappas or Guldin. Gamma function, Beta function.

UNIT-IV: Differential Equations; Differential Equations of first order and its applications, Linear equation of second order, Simultaneous differential equation.

UNIT-V: Partial differential equation of first order, Linear homogenous partial differential equation, Application of partial differential equation.

Books Recommended :

1-Diffrential Calculus by Gorakh Prasad.

2-Integral Calculus by Gorakh Prasad.

3-Diffrential Equation by P.N. Chattrjee.

4-Engineering Mathematics by Bali & Iyangar.

5- Engineering Mathematics by H.K. Das.

6-Higher Engineering Mathematics by B.S. Grewal.

BSH 116 – ENGINEERING CHEMISTRY LAB

BSH-116	Credits	L	T	P
	2	0	0	3

1. To determine the Normality and Strength (g/L) of given KMnO4 solution titrating against standard (N/30) Mohr's salt solution

2. To determine the Normality and Strength (g/L) of given Ferrous Ammonium Sulphate solution 'A' using standard Ferrous Ammonium Sulphate (N/30) solution 'B' taking KMnO4 solution as an intermediate.

3. To determine the concentration of hypo solution (Na2S2O3.5H2O) iodimetrically titration with given Iodine (N/50) solution

4. To prepare the Urea Formaldehyde resin and calculate the yield.

5. To prepare the Aspirin and calculate the yield.

6. Study of Bomb Calorimeter

7. Study of Cleveland's Apparatus

8. Find out the Total hardness of given water sample using 0.01M EDTA solution, buffer solution (pH-10) and EBT as an indicator.

9. Find out the Permanent hardness of given water sample using 0.01M EDTA solution, buffer solution (pH-10) and EBT as an indicator

10.Find out the Temporary hardness of given water sample using 0.01M EDTA solution, buffer solution (pH-10) and EBT as an indicator.

11.Determination of dissolved oxygen in the given sample water

12.To determine chloride ion in a given water sample by Argentometric method (Mohr's method)

ME 117 - ENGINEERING MECHANICS LAB

ME-117	Credits	L	T	P
	2	0	0	3

1.Varification of Law of Parallelogram of force.

2. Verification of law of triangle of forces.

3. Verification of law of polygon of forces.

4. Verification of law of moment.

5. Practical verification of forces in the member of nib crane.

6. Practical verification of forces in the member of roof truss.

7. Determination of coefficient of friction between two given surface.

8. Determination of coefficient of wheel and axle.

9. Determination of coefficient of single purchase winch crab.

10. Determination of coefficient of double purchase winch crab.

11. Determination of coefficient of simple screw jack.

ME-118 ENGINEERING DRAWING

ME-118	Credits	L	T	P
	2	0	0	3

UNIT- I: CONVENTIONAL LINES, DRAWING SHEETS – THEIR LAYOUT &

PLANNING; Technical lettering – Introduction, single stroke letters, capital and lower letters Scales – Introduction, Representative fraction, construction of scales, Types- plain & diagonal scale. Cycloid curve- Cycloid, Epicycloids & Hypocycloid, Involutes to a plain curve. Spiral curve – Archimedean spiral and logarithmic spiral.

UNIT- II: Projection of points; Concept of quadrant system, first angle and third angle projection, projection of point in all quadrants. General procedure to draw projection of points on HP & VP. Projection of lines – Different situation of lines in spaces.

UNIT- III: Theory of orthographic projection & projection of planes.

UNIT –IV: Projection of solids & section of solids

UNIT – V: Development of Surfaces & Isometric Projection

Recommended Text Book

1. Fundamental of Engineering Drawing – Luzzadar & Dulf, PHI

2. Engineering Drawing – N.D. Bhatt, Charottar Publishing House

3. Engineering Drawing – Arshad Siddiquee, Zahid Khan & Ahmed , PHI

4. Engineering Drawing – P.S. Gill, S.K. Kataria & Sons publishers.

BSH-121 - ENVIRONMENTAL STUDIES

BSH-121	Credits	L	T	P
	4	3	1	0

Environment and ecology: Segments of environment. Concept, structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, food chains, food webs and ecological pyramids. Types, characteristic features, structure and function of terrestrial and aquatic ecosystem. **Environmental Pollution:** Definition, cause, effects and control measures of Air pollution, Water pollution and Land pollution. Smog (Oxidizing & Reducing), Acid rain, Green house effect, Ozone depletion, BOD, COD, Eutrophication, and Solidwaste management.

Green Chemistry: Introduction, Principles of green chemistry, Introduction to green solvents and green catalysis: Water, Ionic liquid, CO2, bio-catalysis.

Green technologies: Photochemistry, Sonochemistry, and Microwave assisted reactions.

Renewable energy resources: Solar, Wind, Hydro, Geothermal, Ocean, Fuel cells.

Books:

1. Introduction to Environmental Engg. & Sciences, G. M. Matlers, Prentice Hall of India Pvt. Ltd.

2. Environmental Sciences, B. J. Novel, Printice Hall Inc.

3. Environmental Chemistry, A.K. De, New Age International (P) Ltd., 5th Ed.

4. Chemistry of the Environment, Thomas G. Spiro, William M. Stigliani, 2nd Edition Prentice Hall of India pvt. Ltd.

5. Essential of Ecology and Environmental Sciences, S. V. S Rana, 4th Edition, PHI, Learning Pvt. Ltd.

6. Environmental chemistry and Pollution Control ,S.S Dara,, S. Chand & Company Ltd.

7. Green Chemistry: Environmentally Benign Reactions, V. K. Ahluwalia, Ane Books India, New Delhi, 2006.

8. Chemistry for Green Environment, M. M. Srivastava, R. Sanghi, Narosa, New Delhi, 2005

9. Renewable Energy Sources and Emerging Technologies, D. P. Kothari, Rakesh Ranjan, and K. C. Saigal,Prentice Hall of India Pvt. Ltd.

10. Man & Environment, M.C. Das & P.C. Mishra, McMillan India Ltd.

ME-122 ENGINEERING THERMODYNAMICS

ME-122	Credits	L	T	P
	4	3	1	0

UNIT-I: BASIC CONCEPTS AND DEFINITION; Thermodynamic System, Surrounding and Universe, Phase, Microscopic and Microscopic Point of View, Thermodynamic Equilibrium, Property, state, Path, Quasi-static Process, Reversible and Irreversible process. Heat and work Forms of work during quasi-static or reversible process, work as a path function, Heat, various thermodynamic processes. Temperature and Zeroth law of thermodynamics, First law of thermodynamics- first law of thermodynamics undergoing cyclic process, first law of thermodynamics undergoing a process, Internal energy of a perfect gas, Application of first law to a closed system, First law of thermodynamics for flow process- flow processes and control volume, flow energy and flow work, first law of thermodynamics applied to open system, General study flow energy equation, application of study flow energy equation

UNIT-II: SECOND LAW OF THERMODYNAMICS; Limitation of first law and essence of second law, thermal reservoir, heat engine, thermal efficiency of heat engine, heat pump and co-efficient of performance, statement of second law, equivalence of Kelvin and clausius statement, types of Irreversibility, Carnot cycle, Corollary 1 & 2, Entropy -Clausius inequality, Entropy Principle, temperature and entropy diagram, application of entropy principle.

UNIT-III: PROPERTIES OF PURE SUBSTANCE; Properties of steam – types of steam, wet, saturated and superheated steam, phase transformation at constant pressure, T-s and h-s diagram, sensible heat, latent heat, superheat, internal energy, enthalpy, dryness fraction. Steam Processes – Constant volume, adiabatic, isothermal, polytropic, entropy of steam.

UNIT- IV: Vapour Power cycle; Carnot vapour cycle, rankine cycle , effect of operating conditions on ranking efficiency, principle & method of increasing the thermal efficiency, deviation of actual cycle from theoretical cycle, thermal efficiencies and specific steam

consumptions, requirement of an ideal working fluid, the reheat cycle, binary vapour cycle

UNIT-V: Gas power cycles & Boilers; Air Standard Cycle- Otto, Diesel and Dual, Comparison among cycles, Boilers, Types, Requirements of boiler, boiler efficiency, boiler mountings and accessories.

Recommend Text Books

11.Engineering Thermodynamics - P.K. Nag , TMH Publisher.

12.Engineering Thermodynamics – C.P. Arora, TMH Publisher

13.Engineering Thermodynamics - Cengel, TMH, Publisher

14.Engineering Thermodynamics - Jones Dugan, PHI Publisher

15.Fundamentals of Engg Thermodynamics - R. Yadav, C. P House Publisher

16.Applied Thermodynamics – Onkar Singh, New Age Publishing Co.

BSH 123 -BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

BSH-123	Credits	L	T	P
	4	3	1	0

UNIT 1: - Dc Networks: Kirchoff's Laws, node voltage and mesh current methods, star-delta transformation, classification of Network Elements, Superposition theorem, Thevenin and Norton theorems, maximum power transfer theorem, only independent sources, source conversion.

UNIT 2: - Single Phase AC Circuits: RMS value, average value, form factor, solution of R,L,C series and parallel circuits, representation of impedance, phasor diagram, power in complex notation, series and parallel resonance. Three phase AC Circuits: Delta and star connections, line and phase quantities, solution of three phase circuits, balanced supply voltage and balanced load, phasor diagram, measurement of power in three phase circuits.

UNIT 3: - Introduction of Electrical Machines – Faradays' laws of electromagnetic induction, Single phase Transformer: Construction, emf equations, rating, phasor diagram on no load and full load, equivalent circuit, regulation, losses, efficiency, open and short circuit tests.

UNIT 4:- D. C. Machines: Construction, emf and torque equations, classification and application and characteristics of DC motors, speed control. Single and three phase Induction Motors: Construction, principle of operation, torque-slip curve, starting of single phase IM, application of three phase and single phase induction motors.

UNIT 5: - Semiconductor Devices: V-I characteristics of P-N Junction diode, diode parameters, equivalent circuits, zener diode, working and characteristics, applications.Rectifiers: Analysis of half wave & full wave rectifier with resistive load, efficiency, ripple factor, filter circuits,

Suggested Text Books and References:

1. Electrical Technology by B.L.Theraja, volume 1 and 2.

2. Electrical Technology by Ian Mckenzie-Smith and Edward Hughes.

3. Basic Electrical Engineering by I.J.Nagrath (TMH)

4. Basic Electrical Engineering:Fitzrald and Higgonbothom, 5th Edition, MGH.

5. Electrical Engineering Fundamentals, Del Torro, Vincent:, 2nd Edition, PHI.

6. Advance Technology: Cotton H, ISSAC Pitman, London.

7. Electronic principles: A. V. Malvino

8. Electronic Devices: Bell

9. Electronic Devices & Circuits: Sanjeev Gupta

10. Electronic Devices & Circuits: Robert. L. Boylestad

BSH 124 - ENGINEERING PHYSICS

BSH-124	Credits	L	T	P
	4	3	1	0

UNIT – I: Special Theory of Relativity; Reference frames, Concept of ether, Michelson-Morley experiment, Einstein's postulates, Lorentz Transformation, Length contraction, Time dilation, variation with velocity, and Mass-Energy equivalence.

UNIT – II: Interference and Diffraction of Light, Introduction of Interference, Young's experiment, theory of Interference, Coherent and non-coherent sources, Fresnel's Bi-prism, Newton's ring. Introduction of diffraction, Fresnel and Fraunhofer diffraction, resultant of n harmonic waves, diffraction due to Plane diffraction grating.

UNIT – III: Electromagnetism; Coulomb's law and superposition principle, Electrostatics Field and potential, Electric Flux, Gauss's law and its Applications, Poisson's and Laplace's equations, Equation of continuity, Ampere's law and its Applications, Maxwell's Electromagnetic equations and their physical significance, Electromagnetic energy (Poynting Theorrem), Electromagnetic waves in free space.

UNIT – IV: Solid State Physics and Devices; Energy band gap of metals, insulators and semiconductors, Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, Construction, working and Applications of P-N Junction diodes and transistor.

UNIT – V: Wave Mechanics and Laser; Introduction, wave-particle duality, De Broglie waves, Wave equation, Phase and Group Velocity, Davisson and Germer experiment. Introduction, elementary idea of spontaneous and stimulated emission, active medium, population inversion, Einstein's coefficients, Applications of lasers.

Text Book's and References

1) Engg. Physics by S. K. Srivastava and R. A. Yadav, New Age Pub. New Delhi

2) Engg. Physics by Uma Mukherjee, Narosa Publication

3) Engg. Physics by M. N. Avadhanulu, S. Chand Pub.

4) Engg. Physics by R. K. Gaur and S. L. Gupta, Dhanpat Rai Publication

5) Electricity and Magnetism by Rangwala and Mahajan, Tata McGraw Hill, 1998

6) Concepts of Physics Part -II by H. C. Verma, Bharati Bhawan (P&D), 1998

7) Modern Physics by Beiser, McGraw Hill Inc. New York, Publication 1995

8) Modern Physics by Mani and Mehta, East-West Press Pvt. Ltd. 1998

BSH 125 – ENGINEERING MATHS-II

BSH-125	Credits	L	T	P
	4	3	1	0

UNIT-1: Linear Algebra: Vector space, Linear dependence and Linear Independence Linear transformation, Rank & Inverse by elementary transformation, System of Linear equations-inconsistency, Eigen valve and Eigen vectors, Caley Hamilton theorem and its application to find inverse.

UNIT-II: Theory of Equations: Polynomial & Polynomial equation, Division Algorithm, roots of equations, Reminder theorem, Factor theorem, Synthetic division, Fundamental theorem of Algebra. Multiplication of roots, Reciprocal equations, Symmetric function of the roots, Descarte's Rule of sign, Cardon's Method, Ferrari's Method Descarte's Method.

UNIT-III: Vector Calculus: Vector functions, Differentiation of vectors, Velocity and acceleration, Scalar and vector field, Gradient of Scalar field, Directional derivative, properties of gradient, Divergence of vector, Point Function, curl of vector point function, properties of divergence and curl, Integration of vector function, Line integral, Surface Integral, Green, Gauss theorem and Stoke's theorem (without proof) and their simple applications.

UNIT-IV: Complex Number : Complex number and its properties, conjugate complex number, Standard form of complex number, De Moivre's theorem, Root's of complex number, Exponential function of complex variable, Circular function of complex variable, Hyperbolic function of complex number, Logarthim of complex number C + iS method of summation.

UNIT-V: Sequence, Convergent, Divergent, Oscillating sequence, Infinite series, Ratio test, Root test, Comparison test, Raabe's Logarithmic test, Couchy's Root test, Gauss's Test, Leibnitz Test Conditionally convergant.

BSH 126 -BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

BSH-126	Credits	L	T	P
	2	0	0	3

List of Laboratory Experiments:
1. Verification of Ohm's Law, KVL & KCL.
2. Verification of Superposition theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Verification of Thevenin's and Norton's Theorem.
5. To Find power factor & circuit constants in R-L-C series circuit.
6. To find V-I characteristics of incandescent Lamp.
7. O.C. & S.C. Tests on single phase transformer.
8. Diode characteristics.
9. Half wave & Full wave Rectifier.
10. Study of Filters.
List of books for laboratory:
1.Laboratory courses in Electrical Engg: Tarnekar, Kharbanda, Bodkhe & Naik.
2.A text book of practicals in Electrical Engg: Dr. N.K.Jain
3.Electronics   Practical   Manuals.

BSH 127 - ENGINEERING PHYSICS LAB

BSH-127	Credits	L	T	P
	2	0	0	3

List of Experiments
1. To determine the wavelength of sodium light with help of Fresnel's Bi-prism.
2. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.
3. To determine the wavelength of sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating.
5. To demonstrate the diffraction pattern and determine the wavelength of different colors of mercury light using diffraction grating.
6. To determine the wavelength and number of lines per cm on a diffraction grating using semiconductor laser diode.
7. To determine the specific rotation of sugar solution with the help of polarimeter.
8. Determine the width of the single slit and diameter of circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
9. To determine the Energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the e/m ratio by Thomson's method
11. To study the P-N junction diode characteristics, in forwarded and reverse bias conditions.
12. To study the Zener diode characteristics.
13. To study the characteristics and gain of Transistor in C-B and C-E mode.
14. To study the FET characteristics and determine different parameters.
15.To study the MOSFET characteristics
Text Book's and References
1. Engg. Physics Practical by M. N. Avadhanulu, S. Chand Pub.
2. Unified Practical Physics by R. P. Goyal
3. Engg. Physics Practical by Ruby Das et. al.
4. Engg. Physics Theory & Experiments by S. K. Srivatava, New Age International

WS 128 - WORKSHOP PRACTICE

WS-127	Credits	L	T	P
	2	0	0	3

Fitting Shop: Preparation of step cutting a job of 5mm thick strip. Preparation of V-notch and V-groove out of 5mm thick strip. Preparation of male female joint out of 5mm thick strip.

Machine Shop: Job on Lathe with plane turning, facing, chamfering and step cutting operation. Job on Shaper for finishing two sides of a job. Job on Drilling machine – drilling holes of size 5mm and 12mm diameter on a job.

Welding Shop: Preparation of Butt joint, Lap joint, T-joint, Corner joint from the given work piece using arc welding.

Carpentry Shop: Prepare a simple Butt joint, Cross Lap joint, T-Lap joint, T-Hole joint and Mortise and Tenon joint.

Smithy and Forging Shop: Forging principles, Study of operations like drawing, upsetting, bending and forge welding.

Foundry Shop: Study of preparation of a mould of one piece pattern on the bench.

Reference books:

i. Workshop Technology by Hajara Choudhary, Vol.-I & II.

ii. Workshop Technology by B.S.Raghuwanshi, Vol.-I & II.

iii. Manufacturing Process by H.S.Bawa, Vol.-I & II.

Scheme & Syllabus

(2nd Year to 4th Year)

B.Tech.

(Chemical Engineering)

III- SEM. to VIII-SEM.

SEMESTER-III

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH2301	Chemical Engineering Thermodynamics – I	3	1	-	40	60	**100**	4
CH2302	Chemical Engineering Calculations	3	1	-	40	60	**100**	4
CH2303	Fluid Mechanics	3	1	-	40	60	**100**	4
CH2304	Mathematics-III	3	1	-	40	60	**100**	4
CH2305	Basic Electronics Engineering	3	1	-	40	60	**100**	4
PRACTICAL								
CH2306	Chemical Engineering Lab	-	-	3	30	20	**50**	2
CH2307	Fluid Mechanics	-	-	3	30	20	**50**	2
CH2308	Basic Electronics Engineering	-	-	3	30	20	**50**	2
Total							**650**	**26**

Total Credits: 26
Total Contact Hour: 32
Total Marks: 650
*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

CH2301: Chemical Engineering Thermodynamics- I (3 1 0)

Unit I : Basic Concepts, Definitions & P-V-T Relations : Approaches of thermodynamics,System & its types, Types of processes, Work, Heat, Energy.

P-V-T Relations of Fluids: Graphical representation of P-V-T behavior, Mathematical representation of P-V-T behavior (Ideal gas law, van der Waals, Beattie-Bridgeman, Benedict-Webb-Rubin, Redlich-Kwong, Virial equation of state), Generalized compressibility factor correlation, Equations of state (Redlich-Kwong, Soave- Redlich-Kwong, Peng-Robinson, Lee-Kesler, Virial coefficient correlation)

Unit II : First & Second Laws of Thermodynamics : First & Second laws, Calculation of internal energy, Enthalpy,Heat capacities, Application of first law for open and closed systems, Throttling process,Joule – Thompson effect.

Second law - Kelvin-Planck statement, Clausius statement, Carnot's cycle,Carnot theorem, Clausius inequality, Entropy and its calculation.

Unit III :Third Law of Thermodynamics : Definition and applications.
Statistical & Non-equilibrium Thermodynamics: Basic concepts and applications

Unit IV : Thermochemistry: Enthalpy, Heat of reaction at constant pressure and volume,Hess's Law of constant heat summation , Effect of temperature on heat of reaction at constantpressure (Kirchoff's equation), Heat of dilution, Heat of hydrogenation, Heat of formation,Heat of neutralization and heat of combustion.

Unit V : Equation of State, VLE/LLE Equilibrium : Le Chatlier's Principle, Kinetic theory,Vapour-liquid equilibria in ideal solution, Liquid-liquid equilibrium diagrams, Equation ofstate of real gas, Principles of corresponding states.

Text / References :

1. Chemical Engineering Thermodynamics by Y.V.C. Rao, Universities Press(India) Ltd.Hyderabad.

2. Engineering Thermodynamics by P. K. Nag, Tata McGraw Hill.

3. Principle of Physical Chemistry by Maron, Samuel H. Pruton Carl F., Oxford & IBHpublishing Co. Pvt. Ltd. New Delhi.

4. Textbook of Physical Chemistry by Samuel Glasstone, Macmillan Co. Ltd. London.

5. Chemical Engineering Thermodynamics by B.F. Dodge.

CH2302: Chemical Engineering Calculations (3 1 0)

Unit I : Review : Concepts of units & dimensions, Pressure, Temperature, Volume, Moles,Average molecular weight , Stochiometry& composition relationships.

Unit II : Gaseous Processes : Ideal gas law, Dalton's law, Amagat's law, Partial pressure andpure component volume, Different methods of solving problems related to gaseous mixtureand chemical reactions in gaseous phase.

Unit III : Vapor Pressure : Concepts of vapor pressure, Vapor pressure of immiscible liquids,Antoine equation, Cox chart, Vapor pressure of solutions and problems based on Raoult's law.
Humidity &Saturation : Difference between saturation & humidity, Different methods ofexpressing saturation & humidity, Psychrometry & its problems.

Unit IV : Material Balance : General equation and concept of law of conservation of mass,Problems on material balance with & without chemical reaction, Recycle, Bypass & purgecalculations, Specific type of industrial applications on above.

Unit V : Energy Balance : General heat balance equation andconcepts of law of conservation of energy, Combustion calculations, Reaction and flametemperature calculations, Heat balances for reacting & non–reacting processes, Specific type ofindustrial applications of above.

Books Recommended :

1. Fundamentals of Chemical Engineering by S.N. Saha., DhanpatRai Pub. Co.(Pvt) Ltd.New Delhi.

2. Chemical Process Principles Part I by Hougen, Watson &Ragatz Vol. I, Asia Publishinghouse.

3. Basic Principle & Calculation in Chemical Engineering by D.M. Himmelblau, PrenticeHall.

4. Stoichiometry by B. I .Bhatt and S.M. Vora, Tata McGraw Hill Pub Co.

CH2303: Fluid Mechanics (3 1 0)

Unit I : Fluid Static & Applications : Hydrostatic equilibrium, Hydrostatic equilibrium incentrifugal field and its applications in chemical engineering like manometers decanters.**Fluid Flow Process :** Velocity gradient and shear, Types of fluids, Concept of viscosity,Kinematic viscosity, Nature of flow- Laminar, turbulent, Reynolds number, boundary layerformation and separation.

Unit II : Basic Equations for Fluid Flow : Mass balance & momentum balance equations,Bernoulli's equation without and with corrections for solid boundaries, Kinetic energy, Frictionfactor, Pump work.

Unit III : Incompressible Fluids : Flow through pipes, Flow characteristics- Shear stress,Friction factor, Laminar flow for newtonian fluids, Hagen Poiseuille equation, Laminar flowfor non-newtonian liquids, Turbulent flow through pipes and close channels and itscharacteristic equations, Friction factor and its dependence on roughness, Reynolds number,Friction factor for flow through channels of non-circular cross section – concept of equivalentdiameter, Frictional losses due to sudden change in velocity or direction of flow; Expansion,Contraction, Effect of fittings, Flow of liquids in thin layers.

Unit IV : Transportation of Fluids : Pipe fitting like bends, elbows, flanges, tee anddifferent types of valves, Seals for moving parts, Pumps, NPSH, Power requirement, Types ofpumps – Centrifugal &positive displacement, Troubleshooting in operation – Priming &cavitations, Characteristic curves – Head / capacity / power / efficiency, Capacity- head flow and head work relationship.
Metering of Fluids : Variable head meters- Venturimeter & orifice meter, Variable areameter – Rotameter, Insertion meters – Pitot tube.

Unit V : Agitation and Mixing of Liquids : Various types of agitators, impellers, propellers,turbines, paddles, Standard turbine design,Circulation velocities and power calculations in agitation process including powercorrelations, Effects of baffles, Blending and mixing,Dimensional analysis, Shell balances,

Books Recommended :

1. Unit Operations of Chemical Engineering by McCabe Smith AndHarriot, Fifth Edition,McGraw Hill Inc.

2. Chemical Engineering by J.M. Coulson and Richardson Vol.-II

3. Unit Operation in Chemical Engineering by Chattopadhyay, Khanna publishers.

CH2304:Mathematics-III (3 1 0)

UNIT-I : Functions of Complex Variable: Complex variable- function of complex variable,limit, continuity and differentiability of a function of complex variable, Analytic functions,Cauchy- Riemann equations, Orthogonal curves, Harmonic functions, Conformal mapping,Bilinear transformation (Mobius transformation), Cauchy integral theorem, Cauchy integralformula, Cauchy's inequality, Taylor theorem, Laurent's theorem.

UNIT-II : Fourier Series and Fourier Transform : Periodic function, Fourier series,Dirichlet's conditions for a fourier series. Advantages of fourier series and determination offourier coefficients, Fourier series of function of periods 2, Change of interval, Even-oddfunctions, Properties of fourier transform,Half range sine and cosine series, Practical harmonic analysis, Fouriertransformation, Fourier sine and cosine transform,.

UNIT-III : Laplace Transformation: Laplace transformation, Properties of Laplacetransformation, First shift theorem, Laplace transform of the derivative of f(t), multiplicationand division by t. Unit step function: Laplace transformation of unit function, second shiftingtheorem, Laplace transform of function and periodic function. Inverse Laplace transformation,Multiplication by s, division by s, First shifting property, Second shifting property, InverseLaplace transform of derivatives, Solution of differential equations by Laplace transform.

UNIT-IV : Correlation & Regression : Scatter diagram, Linear correlation, Measures ofcorrelation, Karl Pearson's coefficient of correlation , Limits for correlation coefficients,Coefficient of correlation for bivariate frequency distribution, Rank correlation, Linearregression, Equations to the line of regression. Regression coefficient, Angle between twolines of regressions.

UNIT –V : Theoretical Distributions: Discrete and continuous probability distribution's, Mathematical expectation, Mean and variance, Moments, Moments generating function,Probability distribution ,Binomial, Poisson and normal distribution,Test of significancebasedon chi-square, T,F,and Z distribution, Degree of freedom, Conditions for applying $X2$ (chisquare)test, Student's test.

Books Recommended :

1. B.S. Grewal B.S. "Higher Engg. Mathematics"

2. Kreyszig E " Advanced Engineering mathematics"

3. Prasad C " Advanced Engineering mathematics"

4. Pati T " Functions of complex variables"

5. Dass H.K. " Advanced Engineering mathematics"

6. Ray M. " Mathematics statistics"

CH2305: Basic Electronics Engineering (3 1 0)

UNIT-I : Junction Diode and its Application : Properties of P-N junction, Open circuit PNjunction, Current component of PN diode, V-I characteristics, Temperature dependence ofV-I characteristics, Diode resistance, Space charge capacitance CT, Diffusion capacitance CD,Junction diode switching times, Diode as a rectifier- half wave & full wave rectifier, Clipper,Clamper.

UNIT-II : Special Purpose Diode : Breakdown diode, Zener diode, Avalanche, Tunnel diode,Photo voltaic effect, Photo diode, Pin diode, LED, LCD, Varactor diode – working & itscharacteristics, Application.

UNIT-III : Transistor and FET : Junction transistor, Transistor current components,Transistor as an amplifier, Transistor construction, Transistor circuit configuration (Commonbase, Common emitter, Common collector) and characteristics, CE current gain, Analyticalexpression for transistor characteristics, Early effect, Ebers-Moll model, JFET construction,Operation, V-I characteristics, Transfer characteristics, Metal oxide semiconductor fieldeffect transistor (MOSFET) : Introduction, construction, operation and characteristics,Depletion MOSFET, Enhancement MOSFET.

UNIT-IV : CRO& Multi Layer Devices : CRT configuration, Focusing, Deflection system &its sensitivity, Lissajous figure pattern.
Thyristor Family : Construction, working & characteristics of SCR, SCS, UJT, Diac, Triac

UNIT-V : Operational Amplifiers : Differential amplifier, CMRR, OPAMP symbol andterminal characteristics, Block schematic of OPAMP, Ideal OPAMP characteristics, PracticalOPAMP characteristics, Inverting amplifier, Non- inverting amplifier, Voltage follower,adder, substractor, comparator, integrator, differentiator, log & antilog amplifier. Measurement and indication of process parameters : Conversion and indication of flow, level, pressure and temperature signals

Books Recommended :

1. Integrated Electronics : Analog & Digital Circuit Systems – Jacob Millman&Halkias,TMH

2. Electronics Devices and Circuit Theory – Boylestad&Nashelsky, 8th Ed., PHI

3. Electronics Devices and Circuit – Allen Mottershead, PHI

4. Integrated Circuits by K.R. Botkar, Khanna Publications

5. A course in Electrical and Electronic Measurements and Instrumentation, DhanpatRai& Sons, 2010, A. K. Sawhney.

SEMESTER-IV

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH2401	Mechanical Operations	3	1	-	40	60	**100**	4
CH2402	Process Instrumentation	3	1	-	40	60	**100**	4
CH2403	Inorganic Chemical Technology	3	1	-	40	60	**100**	4
CH2404	Chemical Engineering Thermodynamics – II	3	1	-	40	60	**100**	4
CH2405	Numerical Methods	3	1	-	40	60	**100**	4
PRACTICAL								
CH2406	Mechanical Operations	-	-	3	30	20	**50**	2
CH2407	Technical Analysis Lab	-	-	3	30	20	**50**	2
CH2408	Chemical Engineering Computational Lab	-	-	-	-	50	**50**	2
Total							650	26

Total Credits: 26
Total Contact Hour: 32
Total Marks: 650
*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

CH2401: Mechanical Operations (3 1 0)

Unit I : Solids Properties, Handing, Mixing, Storage & Transportation : Characterizationofsolid particles, Particle shape, Size, Size analysis, Number of particles in mixture, Screenanalysis, Standard screens, Size measurement for fine particles, Storage of solids, Conveyingof solids – Mechanical and pneumatic (brief descriptions)
Mixing of Solids : Types of important mixers like kneaders, dispersers, masticators, rollmills, muller mixer, pug mixers, blenders, screw mixer etc., Mixing index.

Unit II : Size Reduction : Principle, Major equipment- Crushers, grinders, ultrafine grinders,cutting machines, Energy & power calculations for size reduction, Closed circuit and opencircuit grinding.

Unit III : Settling : Elutriation, Classification and sedimentation, Flow of solids throughfluids, Stokes law, Free and hindered settling, Types of thickeners (batch & continuous),Settling chambers, Cyclones & multi-cyclones and their design, Dust and dump collectors,Electrostatic precipitators, Filter bags, Venturi scrubbers.

Unit IV : Mechanical Separations : Industrial screens; their capacity and effectiveness**Filtration :** Theory, Batch and continuous filtration equipment and their functioning, Filteraids, Clarifiers – Principles only, Centrifugal separation for liquids decanters.

Unit V : Fluidization : Flow of fluids through beds of particles, Kozeny-Carman equation,Burke – Plummer Equation, Ergun equation, Aggregate and particulate fluidization,Fluidization velocity, Porosity, Expansion of fluidized bed, Industrial applications.

Books Recommended :

1. Unit operations of chemical Engineering by McCabe Smith and Harriot, Fifth edition,McGraw Hill Inc.

2. Chemical Engineering by J. M. Coulson and Richardson Vol. -II.

3. Unit Operations for Chemical Engineering by G. G .Brown & Associates.

4. Unit Operations in Chemical Eng. By P. Chattopadhyay, Khanna Publishers.

CH2402: Process Instrumentation(3 1 0)

Unit—I : Process Variables : Introduction to process variables, Static and dynamic characteristics of instruments and their general classification.

Unit—II :Measuring Systems : Elements of measuring system and their functions, Signal transmission, Transmitters : Electronic, pneumatic, transducers.

Unit—III :Measuring Instruments : Principles, Construction and operations of instruments for the measurement, transmission, control/ indication/ recording of various process variables such as temperature, pressure, flow, liquid level,humidity and composition.

Unit—IV :Electro-Pneumatic Transducer : Principles and construction of electro-pneumatic transducer, Pneumatic to electrical converter, Multiplexers, Construction and characteristics of final control elements such as pneumatic control valve, Stepper motor, Motorized valve, Principles and construction of pneumatic and electronic controller.

Unit—V :Data Acquisition & Analysis : Introduction to data acquisition system and intelligent instruments, Process instrumentation diagrams and symbols- Instrumentation of process equipment such asdistillation column, heat exchanger etc.

Books:
1. Patranabis, D, "Principles of Industrial Instrumentation", Tata McGraw-Hill Publishing Co. Ltd.
2. Beckwith, T.G., Marangoni, R.D. and Lienhard, J.H., "Mechanical Measurements", Addison Wesley.
3. Jain, R.K., "Mechanical and Industrial Measurements", Khanna Publishers, New Delhi
4. Johnson, C.D., "Process Control Instrumentation Technology", Pearson Education, Inc.

CH2403: Inorganic Chemical Technology (3 1 0)

Unit I :Sulfur and Sulfur Chemicals : Sulfur, Sulfuric acid, SCSA, DCDA processes, Sodium thiosulfate, Alums.
Marine Chemical Industries : Common salt, Chemicals from sea bittern.

Unit II : Industrial Gases and Selected Inorganic Chemicals : Manufacture and use of Hydrogen, Carbon dioxide, Acetylene, Oxygen, Nitrogen and inert gases, Inorganic chemicals: Barium, boron, chromium, lithium, manganese.

Unit III : Fertilizers : Status of industry, Grading and classification of fertilizers, Rawmaterials, Hydrogen production, Fixation of nitrogen, Synthesis, Ammonia based fertilizers, Phosphoric acid, Phosphaticand other fertilizers: SSP, TSP, UAP, DAP and nitro-phosphate, Potash fertilizers, NPK, Corrosion problems and Materials of construction, Bio-fertilizers.

Unit IV : Soda Ash : Manufacturing, Special materials of construction, Solvay and modifiedSolvay process, Environmental consideration, Corrosion problems and materials ofconstruction.

Chlor Alkali Industry : Electrochemistry of brine electrolysis, Current efficiency, Energyefficiency, Diaphragm cells, Mercury cells, Mercury pollution and control, Caustic soda,Chlorine, Hydrochloric acid, Corrosion problems and materials of construction .

Unit V : Cement, Glass and Refractory: Manufacturing, Environmental consideration,Corrosion problems, Engineering problems and materials of construction.

Books Recommended :

1. Chemical Process Industries – R.N. Shreve & J. A. Brink

2. Chem Tech I, II, III, IV- IIT, Madras

3. Outlines of Chemical Technology by Dryden Co. M. G. Rao and M. Sitting.

CH2404: Chemical Engineering Thermodynamics – II (3 1 0)

Unit I : Thermodynamic Potentials : Postulates, Intensive properties, Criteria of equilibrium, Free energy functions and their significances in phaseand chemical equilibria, Euler relation, Gibbs-Helmholtz equation, Gibbs free energy minimum principle,Maxwell relations, Various TdS equations, Cpand Cvrelations.

Unit II : Thermodynamic Properties of Gases and Liquids : Joule-Thomson coefficient, Clausisus – Clapeyron equationsand some important correlations for estimation of vapor pressures, Estimation of thermodynamicproperties by using equations, graphs and tables.

Unit III : Multicomponent Mixtures : Partial molar properties, Partial molar Gibbs freeenergy, Chemical potential and its dependence on temperature and pressure, Fugacity and itscalculation, Dependence of fugacity on temperature & pressure, Gibbs phase rule and itssignificance.

Unit IV : Properties of Solutions : Ideal solutions (Lewis Randall Rule) Phase equilibrium inideal solutions, Phase equilibrium problems, Excess properties, Gibbs – Duhem relation,Activity & activity coefficient, Dependence of activity coefficient on temperature andcomposition, Excess Gibbs free energy models : UNIQUAC and UNIFAC methods,Margules, Vanlaar, Wilson and NRTLequations, Herny's Law.

Unit V : Chemical Equilibrium : Equilibrium constants in terms of measurable properties,Variation of equilibrium constants with temperature and pressure, Adiabatic reactions,Equilibrium in homogeneous & heterogeneous reactions.

Books Recommended :

1. Chemical Engineering Thermodynamics by Y.V.C. Rao, Universities Press (India) Ltd.Hyderabad.

2. Engineering Thermodynamics by P. K. Nag, Tata McGraw Hill

3. Introduction to Chemical Engineering Thermodynamics by J.M. Smith and H.C. Van Ness,McGraw Hill International Ltd.

4. Chemical Eng. Thermodynamics by S. Sandler.

5. Properties of Gasses and Liquids by Reid Prausnitz and Rolling, McGraw Hill.

CH2405: Numerical Methods(3 1 0)

Unit—I : Approximations and Errors in Computation : Errors and their analysis**,** Types oferrors, General error – formula , errors in numerical computation.
Curve fitting : Method of least squares, Fitting of a straight Line, Fitting of an exponentialcurves, Polynomial fit - Non linear regression (second degree parabola), Leastsquare approximation , Method of moments.

Unit –II : Numerical Solution of Algebraic and Transcendental Equations : Graphicalmethod, Bisection method, Secant method, Regula-falsi method, Newton Raphson method, Iteration method, AITKEN'S method , Newton rate ofconvergence.
Solution of a System of Simultaneous Linear Algebraic Equations Direct Method : Gausselimination method, Gauss Jordan method, Triangularisation method, Crout'smethod,Choleskymethod, III conditioned system of equation and refinement of solution .
Iterative Methods : Jacobi iterative method, Gauss Seidel iterative method, Successive overrelaxation (SOR) method .

Unit III : The Calculus of Finite Differences : Finite differences, Difference formula,Operators and relation between operators, Differences of a polynomial factorial,Effect of an error on a difference table, Inverse operator.

Interpolation with Equal Intervals : Newton's forward and backward interpolationformula.

Central Difference Interpolation Formula : Gauss's forward and backward interpolationformula, Sterling's formula, Bessel's formula, Laplace-Everetts formula, Choice ofinterpolation formula .

Interpolation with Unequal Intervals : Lagrange's interpolation, Newton's differenceformula, Hermit's interpolation, Inverse interpolation.

Unit IV : Numerical Differentiation and Integration : Numerical differentiation, Newton'sforward and backward difference interpolation formula, Maxima and minima of a tabulated function.

Numerical Integration : Newton-cote's quadratic formula, Trapezoidal rule , Simpson's 1/3, Boole's rule, Weddle rule.

Difference Equations : Definition, Order and degree of a difference equation, Lineardifference equations, Difference equations reducible to linear form. Simultaneous differenceequations with constant coefficients, Applications.

Unit V : Numerical solution of Ordinary Differential Equation : Taylor series method, Picard'smethod, Euler's method, Modified Euler method, Runge's method,RungeKutta method , Predict corrector method, Milne's method, Adam – Bashforth method.

Numerical Solution of Partial Differential Equations : Classification of P.D.E. of thesecond order elliptic equations, Solution of Laplace equation, Solution of Poisson's equation,Solution of elliptic equations by relaxation method parabolic equations, Solution of one twodimensional heat equation, Hyperbolic equations, Solution of wave equations .

Recommended Books:-

1. JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.

2. RAO G.S. Numerical Anlysis.

3. Grewal B S Numerical Methods In Engineering and Science.

4. Das K K Advance Engineering Methods.

5. Rajaraman V Computer Oriented Numerical Methods

Semester-V

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH3501	Heat Transfer	3	1	-	40	60	**100**	4
CH3502	Mass Transfer - I	3	1	-	40	60	**100**	4
CH3503	Process Dynamics & Control	3	1	-	40	60	**100**	4
CH3504	Chemical Reaction Engineering - I	3	1	-	40	60	**100**	4
CH3505	Organic Chemical Technology	3	1	-	40	60	**100**	4
PRACTICAL								
CH3506	Heat Transfer	-	-	3	30	20	**50**	2
CH3507	Mass Transfer - I	-	-	3	30	20	**50**	2
CH3508	Process Dynamics & Control	-	-	3	30	20	**50**	2
Total							**650**	**26**

Total Credits: 26
Total Contact Hour: 32
Total Marks: 650
*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

CH3501: Heat Transfer (3 1 0)

Unit I :Conductive Heat Transfer : Heat transfer by conduction in solid, Fourier's Law, Compound resistance in series,Heat flow through a cylinder, Unsteady state heat conduction with applications.

Unit II : Convective Heat Transfer : Heat transfer by forced convection inlaminar and turbulent flow, Natural convection, Counter current, parallel flow, cross flow, Thermal analysis of heat exchangers, Rate of heat transfer, Overall heat transfer coefficient, Individual heat transfer coefficient, Fouling factors.

Unit III :Radiative Heat Transfer : Electromagnetic radiation**,** Radiation heat transfer, Wien's displacement law, Kirchoff's law, Stefan-Biltzmann law, Radiation between surfaces,Combinedheat transfer by conduction, convection and radiation.

Unit IV :Heat Transfer Equipments : Heat exchangers and general design of parallel, countercurrent, Shell & tube heat exchangers, Extended surface equipment.

Unit V :Heat Transfer with phase change : Evaporation – Types of evaporators and fields of their applications, Single andmultiple effect evaporators: their design and operation, Vapor recompression, Heat transfer from condensing vapours, Heat transfer to boiling liquids.

Books Recommended

1. Process Heat Transfer ByD.Q.Kern.

2. Heat Transmission by Mc. Adams

3. Unit Operations of Chemical Engineering – McCabe Warren, L Smith, Julian C and HarriotPeter. Fifth edition McGraw Hill Inc.

4. Chemical Engineering – Coulson J. M., Richardson Vol.-I

CH3502: Mass Transfer - I (3 1 0)

Unit I: Principle of Diffusion : Theory of diffusion, Equimolal and molecular diffusion ingases and liquids, Diffusion velocities, Mass transfer coefficient for mass transfer throughknown areas.

Unit II: Phase Equilibria : Vapor-liquid equilibrium curves and boiling point diagram,Volatility, Solubility of gases, Enthalpy –concentration diagrams.
Equilibrium Stage Operations Principles, Determination of number of ideal stages for twocomponent systems by graphical and absorption factor methods, Application of enthalpyconcentration diagram, Multi-component systems.

Unit III: Distillation : Flash distillation, Design and operation characteristics of plate columns,Analysis of fractionating column by Mc-Cabe Thiele's method and enthalpy concentrationdiagram method, Effect of reflux ratio, Design of sieve plate columns, Plate efficiencies,Azeotropic distillation, Steam distillation.

Unit IV: Gas Absorption : Design of packed towers, Principles of absorption, Rate ofabsorption, Two film theory, Overall coefficients, HTU method, Interrelation between heattransfer, momentum transfer and mass transfer.

Unit V : Adsorption: Types of adsorption, Commercial adsorbent and their application,Characteristics and properties of adsorbents, Adsorption equilibria, Specific surface area of anadsorbent, Selection of adsorbent, Single stage and multistage operation, Rate of adsorption andbreakthrough curve, Elution, Ion-exchange.

Books Recommended

1. Mass Transfer by Robert E Trebyl, McGraw Hill Inc.

2. Unit Operations of Chemical Engineering by McCabe Warren, Smith Julian C andHarriot Peter. Fifth edition McGraw Hill Inc.

3. Introduction to Chemical Engineering by Badger &Bancherro, TATA McGraw HillInc.

CH3503 :Process Dynamics and Control (3 1 0)

Unit I : Process Control : Importance of process control in chemical plants and systems, Various types of Control systems viz open loop and closed loop control, feedback and feed forward control, servo and regulator control; Importance of dynamic behavior of processes in process control, Physicaland block diagram representation of control system, Use of Laplace transformation in analysisof control systems.

Unit II : Simple System Analysis : Laplace transformation and transfer function, Blockdiagrams, Linearization, First and higher order systems, Interacting and non-interactingsystems, Distributed and lumped parameters systems, Dead time.

Unit III : Linear Open Loop Systems : Response of first order, second order and higherorder systems, Linearization of non-linear systems, Transportation lag.
Linear Closed Loop Systems : Study of various control system and their components viz.controllers, final control elements, Measuring instruments, Closed loop transfer functions,Transient response of simple control system, Stability criterion and analysis.

Unit IV : Root Locus, Stability Criterion and Transient Response :
Transient response analysis form root locus, Application of root locus to control system, Routh stability criterion.

Unit V : Frequency Response Analysis : Design of control system by frequency response, Closed loop response by frequency response, Frequency response technique: Phase marginand gain margin, Bode stability criterion; Nyquist stability criterion

Books Recommended

1. Coughnaowr, D.R., "Process Systems Analysis and Control", McGraw-Hill,Inc.

2. Stephanopolous, G., "Chemical Process Control", Prentice-Hall.

3. Seborg, D.E., Edgar, T., and Mellichamp, D.A., "Process Dynamics and Control", JohnWiley and Sons, Inc

4. Bequette, B.W.,"Process Control: Modeling, Design, and Simulation", Prentice-Hall,Inc.

5. Process Control by Hariott P., TMH edn.

CH3504: Chemical Reaction Engineering -I**(3 1 0)**

Unit I : Kinetics of Homogeneous Reactions : Kinetics and thermodynamics of chemical reactions, Kinetics of homogenous reactions rate theories, Analysis of rate equations.

Unit II : Interpretation of Batch Reactor Data : Irreversible reactions, Total pressure method of kinetic studies, Analysis of complex rate equations, Complex reactions, Chain reactions,Variable volume reactions, Rate constants and equilibrium.

Unit III : Ideal Reactor for Single Reaction : Ideal batch reactors, Steady state mixed flow reactor, Steady state plug flow reactor, Size comparison of single reactor, Multiple-reactor system,

Unit IV : Design for Multiple Reaction : Introduction to multiple reaction, Qualitative treatment of product distribution and reactor size for parallel reactions, Reversible first order reactions in series, Favorable contacting patterns for irreversible reactions in series (First order &followed by first order)

Unit V: Temperature and Pressure Effects: Single reaction, General graphical design procedure, Optimum temperature progression, Heat effects- adiabatic and non-adiabatic operations, van Heerden relationship.
Multiple reaction: Temperature and vessel size for maximum production.

Books Recommended

1. Chemical Engineering kinetics by J.M. Smith

2. Chemical Reaction Engineering by O Levenspieal

3. Elements of Chemical reaction Engineering by H.S. Foggler

4. Reaction Kinetics for chemical Engineering by S. H. Walas

CH3505: Organic Chemical Technology (3 1 0)

Unit I : Oils & Fats : Status and scope, Major oils seeds production in India, Expression,Solvent extraction, Energy & solvent requirements, Mineral, seeds and other oil bearingmaterials, Hydrogenation of oils, Corrosion problems and materials of construction ofequipments.

Unit II : Soaps & Detergents : Raw materials, Manufacture of detergents, Active detergentmatter, Biodegradability, Fat splitting, Purification of fatty acids, Soap manufacture, Totalfatty matters (TFM), Glycerin manufacture, Materials of construction.

Unit III : Cane Sugar : Cane production & varieties, Manufacturing equipment &technology, Cane sugar refining, Bagasses utilization, Energy requirements and conservation,Environmental considerations, Khandsari technology, Molasses based industries, Materials ofconstruction.

Unit IV : Polymers : Status and scope, Applications, Classification of polymers, Degree andmodes of polymerization, Molecular weight and it distribution, Selected industrialpolymerization including plastics, Synthetic rubber and polymeric foams, Synthetic fibers.
Penicillin : Manufacturing process, Scope and applications.

Unit V : Regenerated Cellulose : Growth of industry, Raw materials, Pretreatment, Pulping,Manufacture of paper, Recovery of chemicals, Environmental considerations, viscose rayon.
Varnishes and Paints : Scope and applications, Types of coatings, General manufacturing procedure, Environmental considerations.

Book Recommended :

1. Chemical Process Industries – R.N. Shreve & J.A. Brink

2. ChemtechI , II, III , IV – IIT Madras

3. Outlines of Chemical Technology by Dryden , Co. M.G. Rao and M. Sitting.

4. Handbook of Oil &Colour, Chemists Association OCCA.

Semester - VI

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH3601	Mass Transfer - II	3	1	-	40	60	**100**	4
CH3602	Process Equipment Design - I	3	1	-	40	60	**100**	4
CH3603	Fuel Combustion & Energy Technology	3	1	-	40	60	**100**	4
CH3604	Chemical Reaction Engineering - II	3	1	-	40	60	**100**	4
CH3605	Engineering Materials	3	1	-	40	60	**100**	4
PRACTICAL								
CH3606	Mass Transfer - II	-	-	3	30	20	**50**	2
CH3607	Fuel Combustion & Energy Technology	-	-	3	30	20	**50**	2
CH3608	Chemical Reaction Engineering	-	-	3	30	20	**50**	2
Total							**650**	**26**

Total Credits: 26
Total Contact Hour: 32
Total Marks: 650
*INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

CH3601: Mass Transfer – II **(3 1 0)**

Unit I: Humidification Operations : Definitions, Humidity chart and its use in measurementof humidity and calculations of humidification operations, Adiabatic humidification.

Unit II : Leaching : Equipment, Principles of leaching, Calculation of number of ideal stages,Stage efficiency

Unit III : Liquid- Liquid Extraction : Equipment, Principles of extraction, Panchon – Savoritmethod, Counter current extraction using reflux application of McCabe method, Extraction inpacked and spray column.

Unit IV: Crystallization : Principles, yield of crystals, Super solubility curve, Crystal growth,Equipment and application of principles to design.

Unit V : Drying : Equipment, Principles, Mechanism and theory of drying, Calculation ofdrying time.

Book Recommended

1. Mass Transfer by Robert E. Trebyl, McGraw Hill Inc.

2. Unit Operations of Chemical Engineering- McCabe Warren, L. Smith Julian C andHarriot, Peter Fifth edition McGraw Hill Inc.

3. Introduction to Chemical Engineering by Badger &Bancherro TATA McGraw Hill Inc.

CH3602: Process Equipment Design–I (3 1 0)

Pressure and Storage Vessels : Design of pressure and storage vessels and their supports. End closures, Flat plates, Flanged, Dished, Hemispherical, Ellipsoidal and conical ends.

Heat Transfer Equipment : Double Pipe heat exchanger, Shell and tube heatexchanger, Vertical & horizontal condensers and evaporators.

Books Recommended

1. Hand book of Chemical Engineering J.H.Perry

2. Tubular Heat Exchange Manufacture Association Manual

3. ISI Codes.

4. Introduction to Chemical Equipment Design (Mechanical Aspects) by B.C. Bhattacharya– Chemical Engineering Education Development Center.

5. Process Equipment Design By Brownell & Young

6. Process Equipment Design by M.V.Joshi

7. Process Heat Transfer by D.Q.Kern

8. Heat Transmission by McAdams

9. Unit Operations of Chemical Engineering by McCabe Warren, L Smith Julian C andHarriot Peter Fifth edition McGraw Hill Inc.

10. Chemical Engineering by Coulson J.M., Richardson Vol- I

CH3603 :Fuel Combustion &Energy Technology (3 1 0)

Unit I : Solid Fuel : Origin, Composition and classification, Properties & characterization.Coal washing & storage of coal, carbonization of coal, Variousclassification systems of coal briquetting, Carbonization, Gasification of coal, Biomass- wood, charcoal, agro-waste, secondary fuels.
Liquid Fuel : Origin, Composition and classification, Properties & characterization of liquid fuels from petroleum, gasohol and bio-diesel.
Gaseous Fuel : Classification of gaseous fuel, Natural gas, LPG, Refinery gas, Producer gas, Water gas, Bio-gas.

Unit II: Combustion Process : General principles of combustion of solid, liquid and gaseous fuels, Flame and flame temperatures, Draught, Limits ofinflammability, Types of combustion Process- surface, Submerged, Pulsating, Slow combustion.

Unit III: Fuel Combustion Calculation : Fundamentals of air requirements and heating values, Combustion calculationswith numerical examples.

Unit IV: Non – Conventional Energy Sources : General principles with applications andtechnology of solar energy, Geothermal energy, Wind energy, Nuclearenergy, Hydro-electric energy system, Hydrogen as source of energy, Fuel cells.

Unit V : Energy Audit and Conservation : Energy consumption pattern in various sectors, Variousways of energy conservation in various process industries, Energy efficient conversion devices.

Books Recommended

1. Fuel combustion Energy Technology by S.N. Saha ,DhanpatRai Publication Co. Pvt.Ltd. New Delhi.

CH3604 :Chemical Reaction Engineering - II(3 1 0)

Unit-I : Basics of Non-Ideal Flow: Age distribution of fluid, the RTD, Conversion in non-ideal flow reactors, Models for non ideal flow- dispersion model, Chemical reaction and dispersion, Tank in series model.

Unit-II : Mixing of Fluids: Self mixing of single fluid, degree of segregation, Early and late mixing, Mixing of two miscible fluids.

Unit-III : Fluid Particle Reactions: Un-reacted core model: Diffusion through gas film and ash layer control, Chemical reaction control, Rate of reaction for shrinking spherical particles, Determination of rate controlling step.

Unit-IV : Fluid – Fluid Reactions: Kinetic regimes for mass transfer and reaction, Rate equations for various regimes, Film conversion parameter, Application to design, Reactive and extractive reactions.

Unit V: Catalysis : Heterogeneous catalysts, General characteristics, Adsorption on solid surface, Physical properties of catalysts, Preparation of catalyst, Steps in catalytic reactions,Synthesizing the rate law.

Books Recommended

1. Chemical Engineering Kinetics. J.M. Smith.

2. Chemical Reaction Engineering. Octave Levenspiel.

3. Chemical Reaction Engineering. H.ScottFogler.

4. Principles of Reaction Engineering, Central Techno Publications. S.D.Dawande,

5. Chemical Engineering, Volume IV. Coulson and Richardson

CH3605 :Engineering Materials (3 1 0)

Unit I : Crystalline and Non –Crystalline Material : Crystalline state, Atomic bonding, Bravias lattices; Miller indices, Structure of some common inorganic compounds, Structural imperfections: Point defects in crystals.
Mechanical Properties : Mechanical properties like elastic and plastic deformations, hardness, toughness, fatigue, creep etc. and their variation with temperature.

Unit II :Failure of materials : Failure of materials under service conditions, Phase diagram and their relations toproperties of metals and alloys, Response of materials to chemical environment.

Unit III : Corrosion : Mechanism of corrosion- dry and wet corrosion, Factors influencingcorrosion, Atmospheric corrosion, Methods of corrosion control, Cathodic and anodic control,Inhibition and other precautionary measures.

Unit IV : Non-Ferrous Metals : Copper, Brasses, Bronze, Aluminium, their mechanical properties, Workability and applications, Corrosion resistance. Non-metallic materials of construction.

Unit V : Ceramics : Various types specially glasses and refractories, Properties andapplications.
Polymers : Comparison of properties of various polymers and their relationship withchain structure, Some application in chemical industries

Books Recommended

1. CHEMTECH- Materials of Construction by O.P. Kharbanda

2. Corrosion and its Prevention III by K.S.Rajagopalan

3. Introduction to Material Science for Engineers by James F. Shackel Ford.

5. Chemical Engineering HandBook by Robert H. Perry.

6. Element of Material Science and Engineering by L.H.VanVlack

7. Corrosion Engineering by M.G.Fontanne and N.D. Grehnee.

8. Chemistry of Engineering Materials by C.K.Agrawal.

9. Raghavan, V., "Materials Science and Engineering", Prentice Hall of India, New Delhi

10. VanVlack, L.H., "Materials Science for Engineers", Addison-Wesley Publishing Co.

Semester-VII

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH4701	Project Engineering, Economics & Management	3	1	-	40	60	**100**	4
CH4702	Process Equipment Design – II	3	1	-	40	60	**100**	4
CH4703	New Separation Processes	3	1	-	40	60	**100**	4
CH4704	Transport Phenomena	3	1	-	40	60	**100**	4
CH4705-06	Elective – I*	3	1	-	40	60	**100**	4
PRACTICAL								
CH4707	Computer Aided Design & Simulation	-	-	3	30	20	**50**	2
CH4708	Vocational Training Viva Cum Seminar	-	-	3	30	20	**50**	2
CH4709	Minor Project	-	-	3	30	20	**50**	2
Total							650	26

* CH4705 : Petroleum Refinery Engineering

* CH4706 : Polymer Technology- I

  Total Credits: 26
  Total Contact Hour: 32
  Total Marks: 650
  INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)
  L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION.

CH4701:Project Engineering, Economics & Management (3 1 0)

Unit I : Project Engineering : Introduction to project engineering, Difference between project& process engineering, Role of a project leader, General design considerations, Plant layoutand site selection, Flow diagram- qualitative & quantitative, Concept of scale up, Concepts oftechno-economic feasibility report.

Unit II : Project Finance & Accounts: Elementary knowledge of book of accounts – Journal,Ledger, Balance sheet, P/L a/c, Cost and asset accounting methods, Cost estimation, Cash flowinvestment, Production cost, Capital investment, Cost indices, Production and overhead cost,Interest and taxes.

Unit III : Profitability & Alternative Investments: Depreciation and its calculation methods, Scrap value, Salvage value, Book value, Market value, Methods of calculatingprofitability, Alternative investments, Replacement of assets,Rate of return, Payback period, Discounted cash flow.
Break Even Analysis: Break even analysis, Break even chart &its importance.

Unit IV: Project Scheduling: Importance of project and required scheduling and steps,Network techniques,CPM, PERT, Gantt Chart.

Unit V: HR Personnel & Administration : Importance & role of this management function,Recruitment Process, Training & development, Job evaluation – Job analysis, Performanceappraisal, Wages & salary,Administration, Wage policy, Wage survey, Negotiation, Rewards,Motivation, Job enlargement & job enrichment, Brief concepts of public relations, Briefintroduction to Indian Factories Act.

Books Recommended

1. Plant Design & Economics for chemical Engineers by M.S. Peters & K. D.Timmerhaus.

2. Engineering Economics by Tarachand

CH4702 :Process Equipment Design- II (3 1 0)

Mass Transfer Equipment : Absorption tower, Distillation tower, Tunnel androtary dryers.

Books Recommended

1. Hand Book of Chemical Engineering J. H. Pery

2. Coulson & Richardson Vol – VI

3. Mass Transfer by R. Treybal

4. ISI Codes

Candidates have to bring their own copies of ISI Code book and they will be not be suppliedby the university or the examination centers.

CH4703 :New Separation Processes(3 1 0)

Unit I: Overview of Separation Processes: Basic concepts of separation processes; Physico-chemical properties and other factors controlling separation; Limitations of Conventional separation processes and new separation processes; Equilibrium and rate governed separation processes

Unit II: Membrane Separation Processes: Principle of membrane separations process, Advantages and disadvantages; Classification, membrane materials, general methods of preparation and characterization of membranes; Membrane modules; Transport equations and concentration polarization

Unit III : Porous Membrane Based Processes: Reverse osmosis, Ultra-filtration, Micro-filtration, Nano-filtration, Dialysis, Ion-selective membranes and electro-dialysis ; Industrial applications of porous membrane based processes

Unit IV: Non-porous Membrane Based Processes: Gas separation; Pervaporation; Gas separation, Supported and un-supported liquid membranes and their industrial applications; Carrier facilitated transport

Medical applications of membrane; Miscellaneous membrane processes- dialysis, membrane distillation, membrane reactors

Unit V: Other Non-conventional Separation Processes: Foam and bubble fractionation: Principle, classification, separation techniques, column operations; Adsorptive and Extractive Separation-Pressure and temperature swing adsorption, Cryogenic separation, Super- critical fluid extraction; Parametric pumping- Batch, continuous and semi-continuous pumping, Thermal, pH and heatless parametric pumping.
Books:

1. Seader, J D, and Henley E J, "Separation Process Principles", John Wiley & Sons, Inc.
2. King, C J, "Separation Processes", McGraw-Hill, Inc.
3. Nath, K., Membrane Separation Processes, PHI, New Delhi (2008)
4. Baker, R W, Membrane Technology and Applications, John Wiley and Sons, Ltd, UK (2004)

CH4704 :Transport Phenomena (3 1 0)

Unit I : Introduction to Transport Phenomena : Similarity between momentum, heat and mass transfer, The continuum hypothesis, Basic laws of fluid motion, Newton's second law ofmotion, Principle of balance between momentum, Heat and mass transfer, Principles ofconservation of momentum, mass and energy.

Unit II : Momentum Transport Phenomena : Momentum transport in laminar flow:Newton's law of viscosity, Science of rheology, Prediction of viscosity and its dependence ontemperature, pressure and composition, Boundary conditions, Shell balance approach forstress distribution and velocity profiles, Introduction to time derivatives and vector analysis,Equation of continuity and equation of motion and their application in fluid flow problems.

Unit III :Unsteady State Momentum Transport : Flow near a wall suddenly set in motion,Momentum transport phenomena in turbulent flow, Definitions of friction factors, frictionfactor for flow in tubes, around spheres and through packed bed column.

Unit IV : Energy Transport Phenomena : Energy transport in laminar flow: Fourier's lawof heat conduction, Prediction of thermal conductivities and its dependence on temperature,Pressure and composition, Boundary conditions, Shell balance approach, Types of heatsources, Principle of extended surfaces, Types of cooling fans, Free and forced convection.Unsteady state heat transport, Unsteady state heat conduction in solids, Heating of semi-infiniteslab, Heating of finite slab, Application.

Unit V : Mass Transport Phenomena : Definitions of concentration, Velocities and massfluxes, Fick's law of diffusion, Prediction of diffusivity and its dependence on temperature,pressure and composition, Boundary conditions, Shell balance approach for mass transferproblems. Problems of diffusion with homogeneous and heterogeneous chemical reaction, Diffusion and chemical reaction in porous catalyst - the effectiveness factor, Equation ofcontinuity for multicomponent mixtures.

Books Recommended

1. R.B. Bird, W.E. Stewart and E. W.Lighfoot, "Transport Phenomena", John Wiley & Sons.

2. Brodkey, R. S. and Hershey, H. C., "Transport Phenomena", McGraw-Hill

3. Welty, J.R., Wicks, C.W., Wilson, R.E. and Rorrer, G., "Fundamentals of Momentum Heatand Mass Transfer", John Wiley & Sons.

CH4705 :Petroleum Refinery Engineering (3 1 0)

Unit I : Petroleum Crude and Refining : Formation of petroleum crude, Origin & occurrence composition, Classification &physical properties of petroleum crude, Conversion of organic matter into petroleum crude,Different sources of petroleum oil, Refining of petroleum crude, Type of refineries, Planning for operation of oilrefinery.

Unit II :Physical Properties and TestingMethods of Petroleum Products : Physco-chemical properties of various petroleum products as per API / ASTM / BIS specifications.

Unit III :Crude Processing : Treatment of crude, atmospheric and vacuum distillation crude, Distillation &equilibrium, Degree of separation, Type of trays of distillation column& its efficiencies, Types of distillation in a petroleum industries.

Unit IV : Cracking & Reforming Operation : Cracking, Type of cracking, Thermal cracking reaction, Dubbs process&tube still process of thermal cracking, Visbreaking, Delayed coking &fluidized coking,Catalytic cracking, Fixed &moving bed catalytic cracking, Thermal reforming, Catalytic reforming processes.

Unit V : Chemical Treatment &Refining Operation : Chemical treatment of petroleum products, Caustic soda treatment, Treatment withH_2SO_4& H2, Mercaptan removal & oxidation process, Sulphurremoval from petroleum products – Doctor's treatment, hydro de-sulphurization,dewaxing and refining of lubricating oils.

Books Recommended :

1. Petroleum Refinery Engineering by W.L. Nelson

2. Petroleum Refining by Gary and Handwarke, Marcel Dekker

3. Petroleum Refining & Petrochemicals by N.K. Sinha, Umesh Publications New Delhi.

CH4706 :Polymer Technology - I (3 1 0)

Unit I : Introduction to Polymer Science : Classification of polymer and functionality,Polymerization, Polymer structure, Molecular weight distribution, Number average, Weightaverage, z-average Molecular weight, Chemical structure and thermal transition types,Mechanism of polymerization.

Unit II : Polymer Synthesis : Step growth polymerization and its kinetics, Molecular weightof step growth polymerization, Chain growth polymerization and its kinetics, Copolymerizationand its kinetics, Polymerization techniques, Reaction of synthetic Polymer,Chemical structure determination.

Unit III : Conformation, Solution and Molecular Weight : Thermodynamics of polymersolution, Flory Huggins theory, Polymer conformation and chain dimensions, Processof polymer dissolution, Nature of polymer molecules in solution, Measurement of molecularweight, Osmometry, Light scattering, GPC, Viscosity of dilute polymer solution.

Unit IV : Soild State Properties : Amorphous state, Glass transition temperature, Glassysolid and glass transition, The crystalline state, Crystal melting temperature, Degree ofcrystallinity& its effect on properties of polymer, Mechanical properties and methods of itstesting.

Unit V : Polymer Degradation & the Environmental Effect : Polymer degradation andstability, Types of degradation, Thermal degradation, Mechanical degradation, Photodegradation, Degradation by high energy radiation, Hydraulic degradation, The management ofplastic in environment, biodegradation.

Books Recommended :

1. Polymer Science and Technology by Fried

2. Outlines of Polymer Technology by Sinha PHI

Semester-VIII

Paper Code	Subject	Periods			Evaluation Scheme		Total	Credits
		L	T	P	IA	ESE		
THEORY								
CH4801	Process Utilities and Safety	3	1	-	40	60	**100**	4
CH4802	Optimization Techniques in Chemical Engineering	3	1	-	40	60	**100**	4
CH4803	Environmental Pollution Control Engineering	3	1	-	40	60	**100**	4
CH4804-05	Elective – II*	3	1	-	40	60	**100**	4
PRACTICAL								
CH4806	Environmental Pollution Control Engineering	-	-	3	30	20	**50**	2
CH4807	Major Project	-	-	12	90	60	**150**	6
CH4808	Comprehensive Viva	-	-	-	-	50	**50**	2
Total							**650**	**26**

* CH4804 : Petrochemical Engineering

 CH4805 : Polymer Technology- II
Total Credits: 26
Total Marks: 650

INTERNAL ASSESSMENT-(MSE- Mid Semester Examination of 20 Marks, Two Class Test/Assignment/Quizzes/Group Discussion etc.)

L-LECTURE, T-TUTORIAL, P-PRACTICAL,CT-CLASS TEST, E.S.E –END SEMESTER EXAMINATION

CH4801 :Process Utilities and Safety (3 1 0)

Unit I :Introduction : Role and types of process utilities in process industries.
Heat Transfer Media : Characteristics properties, Classification, Selection and their industrialapplication.

Unit II : Steam System : Generation and application in chemical process plants, Design of efficient steamheating systems, Condensate utilization, Flash steam.
Steam Traps : Types and characteristics.

Unit III : Water: Characteristic and conditioning for process industries e.g., steam piping, boilerfeed, cooling etc., Recycling of process water.

Unit IV :Introduction to process safety : Accidents and loss statistics, Nature of the accidents /hazardous process.
Toxicology : Toxic material and biological response, Dose responses relationship and models,Threshold dose and its definition, Material safety data sheets and industrial hygiene evaluation.
Safety Devices : Personal safety devices and general hygiene management, Storage and ventilation.

Unit V : Fire and Explosion : Definition, Flammability characteristics and explosion, Designto prevent fires and explosions by inverting, purring, ventilation, sprinkler systems, Staticelectricity controls,Relief and relief sizing in vapor/gas, Liquid and runway reaction services.

Books Recommended :

1. Handbook of Heat Transfer Media by P. L. AaeringerRenold.

2. High Temperature Heat Carrier by A. V. Chechetckin, Pergammon Press.

3. Efficient use of Steam by P. M. Goodal, Guilford

4. Chemical Process Safety : Fundamentals with applications by A. Crowl Daniel and F. L.Joseph, Prentice Hall.

CH4802: Optimization Techniques in Chemical Engineering (3 1 0)

Unit I : System Analysis and Modeling : Introduction to systems analysis and modeling with reference to chemical engineeringproblems,Differential method for solving one and two variable problems with and without constraints, Case studies, Application of langrangian multiplier method.

Unit II : Linear Programming : Modeling,Graphical method,Single phase simplex method, Two phase simplex method,Duality,Sensitivity analysis.

Unit III : Geometric Programming :As applied to chemical engineering problems with degree of difficulty equal to zero andone, With and without constraints.

Unit IV : Search Methods : Sequential search methods - Golden section method, Dichotomous search method, Interval halving method, Fibonacci method.

Unit V :Dynamic Programming : Introduction to dynamic programming as applied to discrete multistage problems like cascade of CSTR, Train of heat exchanger etc.,Computer programming techniques applied to optimization.

Book Recommended:

1. Optimization Theory and Practice by Beveridge and Schecheter

2. Optimization Techniques for chemical Engineers by AsgharHussain

3. Optimization by S.S. Rao

4. Linear Programming by Hadley

CH4803 :Environmental Pollution Control Engineering (3 1 0)

Unit I :Environmental Pollution and Its Effect : Environment and its components, Sources and type of pollutants, General effects on man, animal, vegetation and property.

Unit II : Air Pollution : Air quality criteria and standards, Ambient air sampling and analysis, Stack emission standards, Stack sampling and analysis, Meteorology and dispersion of air pollutants, Atmospheric lapse rate and stability, Plumebehavior, Control of gaseous and particulate pollutants from mobileand stationery sources.

Unit III : Water Pollution : Water quality criteria and effluent discharge standards,Domestic and industrial sources of waste water, Waste water sampling and analysis methods as per BIS specifications, Physico-chemical and biological methods of waste water treatment, Recovery of materialfrom process effluents.

Unit IV: Pollution Due to Hazardous Industrial Waste : Nature of hazardous waste materials from various chemicaland allied Industries, Methods of disposal, destruction and reuse, Nuclear wastes and their management.
Solid waste from commercial, domestic and industrial sectors-composition and characterization, recycle, resource recovery and disposal.
Unit V: Environmental Pollution Management : Case studies of air and water pollution control inchemical industries.

Books Recommended :

1. Environmental Pollution Control Engineering by C. S. Rao, New Age InternationalLtd.

2. Environmental Engineering by N NBasak, Tata McGraw-Hill Pub. Co. Ltd.

3. Essentials of Environmental Studies by K. Joseph and R. Nagendran, PearsonEducation (Singapore) Pvt. Ltd.

CH4804 :Petrochemical Technology (3 1 0)

Unit I :Survey of Petrochemical Industries : Petrochemical industries in India, Plastic andsynthetic fiber industries, Product of petroleum industries, Feed stocks for petrochemicalproduction, Purification and separation of feed stocks.

Unit II :C_1 and C_2 Hydrocarbons : Chemicals from methane,ethane, ethylene andacetylene, Synthesis gas as a feed stock for chemical industries, Naphtha cracking and reforming, Hydrogen from reforming of hydrocarbons.

Unit III :Chemicals from C3, C4 and Higher Fractions : Carbon compound, Dehydrogenation ofhydrocarbon and higher paraffins, Greases and lubricants, Polymers and theirproperties, Polymers from olefins-polyethylene (HDPE, LDPE), Polypropylene, Vinyl polymers.

Unit IV :Aromatic Hydrocarbons : Production of BTX, Benzene derivatives, Products from toluene, Oxidation products of toluene, Synthetic fibersand their production, Synthetic rubber and itsproduction.

Unit V : Plastics : Classifications ofplastics, Different types of resin and their production, ABS plastics, Poly carbonates (PC), Poly urethanes, Polyimides, Polystyrene, Synthetic detergents and theirproduction.

Books Recommended :

1. Modern Petroleum Technology by G.D. Hobson and W Pow.

2. A Textbook on Petrochemical Technology by BhaskaraRao.

CH4805 :Polymer Technology - II (3 1 0)

Unit I : Additives, Blends & Composites : Additives, Plasticizers, Fillers &reinforcements,Stabilizers, Flame retardants, Biocides, Processing additives, Colorants, Polymer blends,Interpenetrating network, Introduction to polymer composites, Composite fabrication.

Unit II : Polymer Reaction : Hydrolysis, Acidolysis, Aminolysis, Hydrogenation, Additionand sustitutionreaction, Reaction of various specific groups, Cross linking reaction,Reaction leading of graft &block copolymers, Miscellaneous reactions.

Unit III : Experimental Methods : Polymers synthesis, Isolation and purification ofpolymers, Polymer fractionation, Molecular weight determination, Molecular weightdistribution curve, Determination of glass transition temperature.

Unit IV : Engineering and Specialty Polymers : Engineering thermoplastics, Polyolefins,Vinyl polymers, Polyamides, Polycarbonates, Polysulphone, Fluoropolymers, Inorganicpolymers, Thermoplastic polyesters, Natural and synthetic rubber, Cellulose and itsderivatives.

Unit V : Polymer Processing & its Manufacturing : Basic processing operations, Extrusion,Modeling, Calendering, Coating, Injection moulding, Compression moulding, Transfermoulding, Blow moulding, Die casting, Rotation casting, Film casting.

Books Recommended:

1. Polymer Science and Technology by Fried

2. Outlines of Polymer Technology by Sinha PHI

CODE OF CONDUCT FOR STUDENTS

CODE OF CONDUCT FOR STUDENTS

The students are admitted to Guru Ghasidas Vishwavidyalaya to achieve excellence and shape their character to become responsible citizens. They must realize their responsibility towards the Vishwavidyalaya and to its components like faculty, staff and fellow students. Failure to maintain a good standard of conduct shall result in disciplinary action.

Attendance: 75% attendance is compulsory in each subject.

Misconduct: Any of the following activities (but not limited to these only) will be treated as misconduct.

1. Disruption of teaching activities or disturbing the learning process of other students on the campus.

2. Any act on the part of the students, which disrupts functioning of the university, endangers health and safety of campus residents and da mages Vishwavidalaya properties.

3. Cheating in examination and supplying of false documents / information in order to seek any consideration / favour from the University.

4. Possession or consumption of intoxicating beverages on the campus.

5. Failure to return back loaned material, settle University dues.

6. Possession of weapons.

7. Use of unparliamentarily language while in conversation with Vishwavidyalaya Staff and fellow students.

Disciplinary Actions:

Failure to adhere to good conduct may result in disciplinary actions like:

1. A warning by the authorities.

2. Suspension from a particular class.

3. Suspension / expulsion from the University.

4. Suspension of campus privileges e.g. hostel, accommodation etc.

5. Withholding of examination result or withdrawal of awarded diploma / degree certificate.

6. Any other disciplinary action deemed appropriate by the University authorities.

ABOUT RAGGING

ABOUT RAGGING

UGC DRAFT REGULATIONS ON CURBING THE MENACE OF RAGGING IN

HIGHER EDUCATIONAL INSTITUTIONS, 2009

In exercise of the power conferred by Clause (g) of Sub-Section (1) of Section 26 of the University Grants Commission Act, 1956, the University Grants Commission hereby makes the following Regulations, namely-

1. Title, commencement and applicability:-

1.1. These regulations shall be called the "UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009".

1.2. They shall come into force with immediate effect.

1.3. They shall apply to all the universities established or incorporated by or under a Central Act, a Provincial Act or a State Act, to all institutions deemed to be university under Section 3 of the UGC Act, 1956, to all other higher educational institutions, including the departments, constituent units and hall the premises (academic, residential, sports, canteen, etc) of such universities, deemed universities and other higher educational institutions, whether located within the campus or outside, and to all means of transportation of students whether public or private.

2. Objective:-

To root out ragging in all its forms from universities, colleges and other educational institutions in the country by prohibiting it by law, preventing its occurrence by following the provisions of these Regulations and punishing those who indulge in ragging in spite of prohibition and prevention as provided for in these Regulations and the appropriate law in force.

3. Defi nitions:-

For the purposes of these Regulations:-

3.1 "college" means any institution, whether known as such or by any other name, which provides for a programme of study beyond 12 years of schooling for obtaining any qualifi cation from a university and which, in accordance with the rules and regulations of such university, is recognized as competent to provide for such programmes of study and present students undergoing such programmes of study for the examination for the award of such qualifi cation.

3.2 "Head of the institution" means the 'Vice-Chancellor' in case of a university/deemed to be university, 'Principal' in case of a college, 'Director' in case of an institute.

3.3 "institution" means a higher educational institution (HEI), like a university, a college, an institute, etc. imparting higher education beyond 12 years of schooling leading to a degree (graduate, postgraduate and/or higher level).

3.4 Ragging" means the following: Any disorderly conduct whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness any other student, indulging in rowdy or undisciplined activities which causes or is likely to cause annoyance, hardship or psychological harm or to raise fear or apprehension thereof in a fresher or a junior student or asking the students to do any act or perform something which such student will not in the ordinary course and which has the effect

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of causing or generating a sense of shame or embarrassment so as to adversely affect the physique or psyche of a fresher or a junior student.

3.5 "University" means a university established or incorporated by or under a Central Act, a Provincial Act or a State Act, an institution deemed to be university under Section 3 of the UGC Act, 1956, or an institution specially empowered by an Act of Parliament to confer or grant degrees

4 Punishable ingredients of Ragging:-

• Abetment to ragging;

• Criminal conspiracy to rag;

• Unlawful assembly and rioting while ragging;

• Public nuisance created during ragging;

• Violation of decency and morals through ragging;

• Injury to body, causing hurt or grievous hurt;

• Wrongful restraint;

• Wrongful confinement;

• Use of criminal force;

• Assault as well as sexual offences or even unnatural offences;

• Extortion;

• Criminal trespass;

• Offences against property;

• Criminal intimidation;

• Attempts to commit any or all of the above mentioned offences against the victim(s);

• All other offences following from the defi nition of "Ragging".

5 Measures for prohibition of ragging at the institution level:-

5.1 The institution shall strictly observe the provisions of the Act of the Central Government and the State Governments, if any, or if enacted, considering ragging as a cognizable offence under the law on a par with rape and other atrocities against women and ill-treatment of persons belonging to the SC/ST, and prohibiting ragging in all its forms in all institutions.

5.2 Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, residential, sports, canteen, etc) whether located within the campus or outside and in all means of transportation of students whether public or private.

5.3 The institution shall take strict action against those found guilty of ragging and/or of abetting ragging.

6 Measures for prevention of ragging at the institution level:-

6.1 Before admissions:-

6.1.1 The advertisement for admissions shall clearly mention that ragging is totally banned in the institution, and anyone found guilty of ragging and/or abetting ragging is liable to be punished Appropriately (for punishments, ref. section 8 below).

6.1.2 The brochure of admission/instruction booklet for candidates shall print in block letters these Regulations in full (including Annexures).

6.1.3 The 'Prospectus' and other admission related documents shall incorporate all directions of the Supreme Court and / or the Central or State Governments as applicable, so that the candidates and their parents/ guardians are sensitized in respect of the prohibition and consequences of ragging. If the institution is an affi liating university, it shall make it mandatory for the institutions under it to compulsorily incorporate such information in their 'Prospectus'.

6.1.4 The application form for admission/ enrolment shall have a printed undertaking, preferably both in English/Hindi and in one of the regional languages known to the institution and the applicant (English version given in Annexure I, Part I), to be filled up and signed by the candidate to the effect that he/she is aware of the law regarding prohibition of ragging as well as the punishments, and that he/she, if found guilty of the offence of ragging and/or abetting ragging, is liable to be punished appropriately.

6.1.5 The application form shall also contain printed undertaking, preferably both in English/Hindi and in one of the regional languages known to the institution and the parent/ guardian (English version given in Annexure I, Part II), to be signed by the parent/ guardian of the applicant to the effect that he/ she is also aware of the law in this regard and agrees to abide by the punishment meted out to his/her ward in case the latter is found guilty of ragging and/or abetting ragging.

6.1.6 The application for admission shall be accompanied by a document in respect of the School Leaving Certifi cate/ Character Certifi cate which shall include a report on the behavioral pattern of the applicant, so that the institution can thereafter keep intense watch upon a student who has a negative entry in this regard.

6.1.7 A student seeking admission to the hostel shall have to submit another undertaking in the form of Annexure I (both Parts) along with his/ her application for hostel accommodation.

6.1.8. At the commencement of the academic session the Head of the Institution shall convene and address a meeting of various functionaries/agencies, like Wardens, representatives of students, parents/ guardians, faculty, district administration including police, to discuss the measures to be taken to prevent ragging in the Institution and steps to be taken to identify the offenders and punish them suitably.

6.1.9. To make the community at large and the students in particular aware of the dehumanizing effect of ragging, and the approach of the institution towards those indulging in ragging, big posters (preferably multicolored with different colours for the provisions of law, punishments, etc.) shall be prominently displayed on all Notice Boards of all departments, hostels and other buildings as well as at vulnerable places. Some of such posters shall be of permanent nature in certain vulnerable places.

6.1.10 The institution shall request the media to give adequate publicity to the law prohibiting ragging and the negative aspects of ragging and the institution's resolve to ban ragging and punish those found guilty without fear or favour.

6.1.11 The institution shall identify, properly illuminate and man all vulnerable locations.

6.1.12 The institution shall tighten security in its premises, especially at the vulnerable places. If necessary, intense policing shall be resorted to at such points at odd hours during the early monthsof the academic session.

6.1.13 The institution shall utilize the vacation period before the start of the new academic year to launch wide publicity campaign against ragging through posters, leafl ets. seminars, street plays, etc.

6.1.14 The faculties/ departments/ units of the institution shall have induction arrangements (including those which anticipate, identify and plan to meet any special needs of any specifi c section of students) in place well in advance of the beginning of the academic year with a clear sense of the main aims and objectives of the induction process.

6.2 On admission:-

6.2.1 Every fresher admitted to the institution shall be given a printed leafl et detailing when and to whom he/she has to turn to for help and guidance for various purposes (including Wardens, Head of the institution, members of the anti-ragging committees, relevant district and police authorities), addresses and telephone numbers of such persons/ authorities, etc., so that the fresher need not look up to the seniors for help in such matters and get indebted to them and start doing things, right or wrong, at their be hest. Such a step will reduce the freshers' dependence on their seniors .

6.2.2 The institution through the leaflet mentioned above shall explain to the new entrants the arrangements for their induction and orientation which promote effi cient and effective means of integrating them fully as students.

6.2.3 The leafl et mentioned above shall also tell the freshers about their rights as bona fi de students of the institution and clearly instructing them that they should desist from doing anything against their will even if ordered by the seniors, and that they have nothing to fear as the institution cares for them and shall not tolerate any atrocities against them.

6.2.4 The leafl et mentioned above shall contain a calendar of events and activities laid down by the institution to facilitate and complement familiarization of juniors with the academic environment of the institution.

6.2.5 The institution shall also organize joint sensitization programmes of 'freshers' and seniors.

6.2.6 Freshers shall be encouraged to report incidents of ragging, either as victims, or even as witnesses.

6.3 At the end of the academic year:-

6.3.1 At the end of every academic year the Vice-Chancellor/ Dean of Students Welfare/ Director/ Principal shall send a letter to the parents/ guardians who are completing the first year informing them about the law regarding ragging and the punishments, and appealing to them to impress upon their wards to desist from indulging in ragging when they come back at the beginning of the next academic session.

6.3.2 At the end of every academic year the institution shall form a 'Mentoring Cell' consisting of Mentors for the succeeding academic year. There shall be as many levels or tiers of Mentors as the number of batches in the institution, at the rate of 1 Mentor for 10 freshers and 1 Mentor of a higher level for 10 Mentors of the lower level.

6.4 Setting up of Committees and their functions:-

6.4.1The Anti-Ragging Committee:- The Anti-Ragging Committee shall be headed by the Head of the institution and shall consist of representatives of faculty members, parents, students belonging to the freshers' category as well as seniors and non-teaching staff. It

shall consider the recommendations of the Anti-Ragging Squad and take appropriate decisions, including spelling out suitable punishments to those found guilty.

6.4.2 The Anti-Ragging Squad:- The Anti-Ragging Squad shall be nominated by the Head of the institution with such representation as considered necessary and shall consist of members belonging to the various sections of the campus community. The Squad will have vigil, oversight and patrolling functions. It shall be kept mobile, alert and active at all times and shall be empowered to inspect places of potential ragging and make surprise raids on hostels and other hot spots. The Squad shall investigate incidentsof ragging and make recommendations to the Anti-Ragging Committee and shall work under the overall guidance of the said Committee.

6.4.3 Monitoring Cell on Ragging:- If the institution is an affi liating university, it shall have aMonitoring Cell on Ragging to coordinate with the institutions affi liated to it by calling for reports from the Heads of such institutions regarding the activities of the Anti-Ragging Committees, Squads, and Mentoring Cells, regarding compliance with the instructions on conducting orientation programmes, counseling sessions, etc., and regarding the incidents of ragging, the problems faced by wardens and other offi cials, etc. This Cell shall also review the efforts made by such institutions topublicize anti-ragging measures, cross-verify the receipt of undertakings from candidates/students and their parents/guardians every year, and shall be the prime mover for initiating action by the university authorities to suitably amendthe Statutes or Ordinances or Bye-laws to facilitate the implementation of anti ragging measures at the level ofthe institution.

6.5 Other measures:-

6.5.1 The Annexure mentioned in 6.1.4, 6.1.5 and 6.1.7 shall be furnished at the beginning of each academic year by every student, that is, by freshers as well as seniors.

6.5.2 The institution shall arrange for regular and periodic psychological counseling and orientation for students (for freshers separately, as well as jointly with seniors) by professional counselors during the first three months of the new academic year. This shall be done at the institution and department/ course levels. Parents and teachers shall also be involved in such sessions.

6.5.3 Apart from placing posters mentioned in 6.1.9 above at strategic places, the institution shall undertake measures for extensive publicity against ragging by means of audio-visual aids, by holding counseling sessions, workshops,painting and design competitions among students and other methods as it deems fit.

6.5.4 If the institution has B.Ed. and other Teacher training programmes, these courses shall be mandated to provide for anti-ragging and the relevant human rights appreciation inputs, as well as topics on sensitization against corporal punishments and checking of bullying amongst students, so that every teacher is equipped to handle at least the rudiments of the counseling approach.

6.5.5 Wardens shall be appointed as per the eligibility criteria laid down for the post refl ecting both the command and control aspects of maintaining discipline, as well as the softer skills of counseling and communicating with the youth outside the class-room situations. Wardens shall be accessible at all hours and shall be provided with mobile phones. The institution shall review and suitably enhance the powers and perquisites of Wardens and authorities involved in curbing the menace of ragging.

6.5.6   The security personnel posted in hostels shall be under the direct control of the Wardens and assessed by them.

6.5.7   Private commercially managed lodges and hostels shall be registered with the local police authorities, and this shall be done necessarily on the recommendation of the Head of the institution. Local police, local administration and the institutional authorities shall ensure vigil on incidents that may come within the definition of ragging and shall be responsible for action in the event of ragging in such premises, just as they would be for incidents within the campus. Managements of such private hostels shall be responsible for not reporting cases of ragging in their premises.

6.5.8   The Head of the institution shall take immediate action on receipt of the recommendations of the Anti-Ragging Squad. He/ She shall also take action suo motto if the circumstances so warrant.

6.5.9   Freshers who do not report the incidents of ragging either as victims or as witnesses shall also be punished suitably.

6.5.10 Anonymous random surveys shall be conducted across the 1st year batch of students (freshers) every fortnight during the first three months of the academic year to verify and cross-check whether the campus is indeed free of ragging or not. The institution may design its own methodology of conducting such surveys.

6.5.11 The burden of proof shall lie on the perpetrator of ragging and not on the victim.

6.5.12 The institution shall fi le an FIR with the police / local authorities whenever a case of ragging is reported, but continue with its own enquiry and other measures without waiting for action on the part of the police/ local civil authorities. Remedial action shall be initiated and completed within the one week of the incident itself.

6.5.13 The Migration / Transfer Certificate issued to the student by the institution shall have an entry, apart from those relating to general conduct and behaviour, whether the student has been punished for the offence of committing or abetting ragging, or not, as also whether the student has displayed persistent violent or aggressive behaviour or any desire to harm others.

6.5.14 Preventing or acting against ragging shall be the collective responsibility of all levels and sections of authorities or functionaries in the institution, including faculty, and not merely that of the specifi c body/ committee constituted for prevention of ragging.

6.5.15   The Heads of institutions other than universities shall submit weekly reports to the Vice-chancellor of the university the institution is affiliated to or recognized by, during the first three months of new academic year and thereafter each month on the status of compliance with anti-ragging measures. The Vice Chancellor of each university shall submit fortnightly reports of the university, including those of the Monitoring Cell on Ragging in case of an affiliating university, to the Chancellor.

6.5.16 Access to mobile phones and public phones shall be unrestricted in hostels and campuses, except in class-rooms, seminar halls, library etc. where jammers shall be installed to restrict the use of mobile phones.

6.6   Measures for encouraging healthy interaction between freshers and seniors:-

6.6.1   The institution shall set up appropriate committees including the course-in-charge, student advisor, Warden and some senior students to actively monitor, promote and regulate healthy interaction between the freshers and senior students.

6.6.2 Freshers' welcome parties shall be organized in each department by the senior students and the faculty together soon after admissions, preferably within the fi rst two weeks of the beginning of the academic session, for proper introduction to one another and where the talents of the freshers are brought out properly in the presence of the faculty, thus helping them to shed their inferiority complex, if any, and remove their inhibitions.

6.6.3 The institution shall enhance the student-faculty interaction by involving the students in all matters of the institution, except those relating to the actual processes of evaluation and of faculty appointments, so that the students shall feel that they are responsible partners in managing the affairs of the institution and consequently the credit due to the institution for good work/ performance is due to them as well.

6.7 Measures at the UGC/ Statutory/ Regulatory bodies' level:-

6.7.1 The UGC and other Statutory /Regulatory bodies shall make it mandatory for the institutions to compulsorily incorporate in their 'Prospectus' the directions of the Supreme Court and/or the Central or State Governments with regard to prohibition and consequences of ragging, and that noncompliance with the directives against ragging in any manner whatsoever shall be considered as lowering of academic standards by the erring institution making it liable for appropriate action.

6.7.2 The UGC (including NAAC and UGC Expert Committees visiting institutions for various purposes) and similar Committees of other Statutory/Regulatory bodies shall cross-verify that the institutions strictly comply with the requirement of getting the undertakings from the students and their parents/ guardians as envisaged under these Regulations.

6.7.3 The UGC and other funding bodies shall make it one of the conditions in the Utilization Certificate for sanctioning any financial assistance or aid to the institution under any of the general or special schemes that the institution has strictly complied with the anti-ragging measures and has a blemishless record in terms of there being no incidents of ragging during the period pertaining to the Utilization Certificate.

6.7.4 The NAAC and other accrediting bodies shall factor in any incident ofragging in the institution while assessing the institution in different grades.

6.7.5 The UGC shall constitute a Board for Coordination consisting of representatives of the AICTE, the IITs, the NITs, the IIMs, the MCI, the DCI, the NCI, the ICAR and such other bodies which have to deal with higher education to coordinate and monitor the anti-ragging movement across the country and to make certain policy decisions. The said Board shall meet once in a year in the normal course.

6.7.6 The UGC shall have an Anti-Ragging Cell within the Commission as an institutional mechanism to provide secretarial support for collection of information and monitoring, and to coordinate with the State level and university level Committees for effective implementation of anti-ragging measures.

6.7.7 If an institution fails to curb ragging, the UGC/ the Statutory/ Regulatory body concerned may stop financial assistance to such an institution or take such action within its powers as it may deem fi t and impose such other penalties as provided till such time as the institution achieves the objective of curbing ragging.

7 Incentives for curbing ragging:-

7.1 The UGC shall consider providing special/ additional annual financial grants-inaid to those eligible institutions which report a blemish-less record in terms of there being no incidents of ragging.

7.2 The UGC shall also consider instituting another category of fi nancial awards or incentives for those eligible institutions which take stringent action against those responsible for incidents of ragging.

7.3 The UGC shall lay down the necessary incentive for the post of Warden in order to attract the right type of eligible candidates, and motivate the incumbent.

8 Punishments:-

8.1 At the institution level:

Depending upon the nature and gravity of the offence as established by the Anti-Ragging Committee of the institution, the possible punishments for those found guilty of ragging at the institution level shall be any one or any combination of the following:

8.1.1 Cancellation of admission

8.1.2 Suspension from attending classes

8.1.3 Withholding/ withdrawing scholarship/ fellowship and other benefi ts

8.1.4 Debarring from appearing in any test/ examination or other evaluation process

8.1.5 Withholding results

8.1.6 Debarring from representing the institution in any regional, national or international meet, tournament, youth festival, etc.

8.1.7 Suspension/ expulsion from the hostel

8.1.8 Rustication from the institution for period ranging from 1 to 4 semesters

8.1.9 Expulsion from the institution and consequent debarring from admission to any other institution

8.1.10 Fine of Rupees 25,000/-

8.1.11 Collective punishment: When the persons committing or abetting the crime of ragging are not identifi ed, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.

8.2   At the university level in respect of institutions under it:

If an institution under a university (being constituent of, affi liated to or recognized by it) fails to comply with any of the provisions of these Regulations and fails to curb ragging effectively, the university may impose any or all of the following penalties on it:

8.2.1 Withdrawal of affi liation/ recognition or other privileges conferred on it

8.2.2 Prohibiting such institution from presenting any students then undergoing any programme of study therein for the award of any degree/diploma of the university

8.2.3 Withholding any grants allocated to it by the university

8.2.4 Any other appropriate penalty within the powers of the university.

8.3   At the UGC level:

If an institution fails to curb ragging, the UGC may impose any or all of the following penalties on it:

8.3.1 Delisting the institution from section 2(f) and /or section 12B of the UGC Act

8.3.2 Withholding any grants allocated to it

8.3.3 Declaring institutions which are not covered under section 2(f) and or 12B as ineligible for any assistance like that for Major/ Minor Research Project, etc.

8.3.4 Declaring the institution ineligible for consideration under any of the special assistance programmes like CPE (College with potential for Excellence), UPE (University with Potential for Excellence) CPEPA (Centre with Potential for Excellence in a Particular Area), etc.

8.3.5 Declaring that the institution does not have the minimum academic standards and warning the potential candidates for admission accordingly through public notice and posting on the UGC Website.

DISCIPLINE AMONG STUDENTS

IN

UNIVERSITY EXAMINATIONS

DISCIPLINE AMONG STUDENTS IN UNIVERSITY EXAMINATIONS

I UNIVERSITY END SEMESTER EXAMINATIONS

1. The end –semester examination shall be held under the general supervision of the Head of Department by the faculty member concerned. He/she shall be responsible for the fair and orderly conduct of the examination
2. In case of detection of unfair means (as specified in clause 1 of General Guidelines below), the same shall be brought to the notice of the head of the department concerned for further action specified under clause 5 of the General Guidelines below

II   ENTRANCE EXAMINATIONS

1. During an entrance examination the candidates shall be under the disciplinary control of the chief Superintendent of the centre who shall issue the necessary instructions. If a candidate disobeys instructions or misbehaves with any member of the supervisory staff or with any of the invigilators at the centre, he/she may be expelled from the examination for that session.
2. The Chief Superintendent shall immediately report the facts of such a case with full details of evidence to the Controller of Examinations who will refer the matter to the Examination Discipline Committee in terms of clause 4 of General Guidelines below. The committee will make recommendations for disciplinary action as it may deem fit to the Vice-Chancellor as provided under clause 7
3. Everybody, before an examination begins, the invigilators shall call upon all the candidates to search their persons, tables, desks, etc. and ask them to hand over all papers, books, notes or other reference material which they are not allowed to have in their possession or accessible to them in the examination hall. Where a late-comer is admitted this warning shall be repeated to him at the time of entrance to the examination hall. They are also to see that each candidate has his/her identification card and hall ticket with him/her.

III GENERAL GUIDELINES

1. Use of Unfair means:
   A candidate shall not use means in connection with any examination. The following shall be deemed to unfair means:
   a. Found in possession of incriminating material related/unrelated to the subject of the examination concerned.
   b. Found copying either from the possessed material or from a neighbor.
   c. Inter-changing of answer scripts.
   d. Change of seat for copying.
   e. Trying to help others candidates.

f. Found consulting neighbours

g. Exchange of answer sheets or relevant materilas.

h. Writing some other candidate's register number in the main answer paper.

i. Insertion of pre-written answer sheets (Main sheets or Additional sheets)

j. Threatening the invigilator or insubordinate behavior as reported by the Chief Superintendent and / or Hall Superintendent.

k. Consulting the invigilator for answering the questions in the examination.

l. Cases of impersonation

m.   Mass copying

n. Using electronic devices for the purpose of malpractice.

The Executive Council may declare any other act of omission or commission to be unfair means in respect of any or all the examination.

2. If the Vice-Chancellor is satisfied that there has been mass-scale copying or use or unfair means on a mass-scale at particular center(s), he may cancel the examination of all the candidates concerned and order re-examination.

3. Where the invigilator incharge is satisfied that one third (1/3) or more students were involved in using unfair-means or copying in a particular Examination Hall. It shall be deemed to be a case of mass copying.

a)   The Chief Superintendent of the examination centre shall report to the Controller of Examinations without delay and on the day of the occurrence if possible, each case where use of unfair means in the examination is suspected or discovered with full details of the evidence in support thereof and the statement of the candidate concerned, if any, on the forms supplied by the Controller of Examination for the purpose.

b)   A candidate shall not be forced to give a statement but the fact of his /her having refused to make a statement shall be recorded by the Chief Superintendent and shall be got attested by two other members of the supervisory staff on duty at the time of occurrence of the incident.

c)   A candidate detected or suspected of using unfair means in the examination may be permitted to answer the question paper, but on separate answer-book. The answer-book in which the use of unfair means is suspected shall be seized by the Chief Superintendent, who shall send both the answer-books to the Controller of Exami9nation with his report. This will not affect the concerned candidate appearing in the rest of the examinations.

d)   All cases of use of unfair means shall be reported immediately to the Controller of the Examination by the Centre Superintendent, examiner, paper-setter, evaluator, moderator, tabulator or the person connected with the University examination as the case may be, with all the relevant material.

4. Examination Discipline Committee

a) All the cases of alleged use of unfair means shall be referred to a committee called the Examination Discipline Committee to be appointed by the Vice-Chancellor.

b) The Committee shall consists of five members drawn from amongst the teachers and officers of the university. One member will be nominated as Chairman from amongstthem by the Vice Chancellor.

c) A member shall be appointed for a term of two years, and shall be eligible for re-appointment.

d) Three members present shall constitute the quorum.

e) Ordinarily, all decisions shall be taken by the Committee by simple majority. If the members cannot reach a consensus, the case shall be referred to the Vice-Chancellor, whose decision shall be final.

f) All decisions taken by the examination discipline committee will be placed before the Vice-Chancellor for approval

g) A candidate within one month of the receipt of the decision of the university may appeal to the Vice-Chancellor, in writing for a review of the case. If the Vice-Chancellor is satisfied that the representation merits consideration, he/she may refer the case back to the Examination Discipline Committee for reconsideration.

5 The Examination Discipline Committee may recommend one of the following punishments for cases of unfair means

Nature of unfair means	Scale of Punishment
If the candidate has used unfair means specified in sub-clause (a) to (g) of clause 3	Cancel all the University Examinations registered by the candidate in that session.
If the candidate has repeated the unfair means shown at 3(a) to (g) a second time	Cancel the University Examination of all subjects registered by the candidate in that session and debar him/her for the next examination session (i.e. all university Examinations in the subsequent session)
If the candidate has repeated the unfair means shown at 3(a) to (g) third time	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for the university Examination
If the candidate has used unfair means specified in sub-clause (h) of clause	Cancel the University Examination of all subjects registered by the candidate during that semester only.
If the candidate has used unfair means specified in sub-clause (i) of clause	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two subsequent Examination sessions.
If the candidate has used unfair means specified in sub-clause (j) of clause 3	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for

	the university Examination
If the candidate has used unfair means specified in sub-clause (k) of clause	Cancel the University Examination of all subjects registered by the candidate for that session
If the candidate has used unfair means specified in sub-clause (l) of clause	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for the examination sessions. Moreover, relevant legal action shall be initiated if an outsider is involved.
If the candidate used unfair means in sub-clause (m) of clause 3	ix) a) In the single Hall: Cancel the relevant examination taken by the students of that Hall. Debar the concerned Hall superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper-setting, valuation, etc. for the next six examination sessions. b) In a Centre: Cancel the relevant examination taken by the students of the center. Debare the Hall Superintendents and the Chief Superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper-setting, valuation, etc. for the next six examination sessions and cancel the examination center for two years

Important Phone No.s

S. No.	POSITION	NAME	Mb. No. & PHONE NO. (07752)
01.	Vice Chancellor (Acting)	Prof. M.S.K. Khokhar	260283, 260353
02.	Registrar (Acting)	Prof. I. D. Tiwari	260209
03.	Controller of Exam	Dr. A. S. Randive	260044
04.	Dean Student Welfare (DSW)	Dr. S.V.S. Chouhan	260204
05.	Proctor	Prof. Pradeep Schukla	09425227219 07752-260206
06.	Chief, Warden Hostel	Prof. S. S. Singh	094241-63260
07.	Visvesvaraya Chair Professor	Dr. P.C. Upadhyay	09425280200
08.	Librarian (Central Library)	Dr. U.N. Singh	07752-260041
09.	Media Incharge	Prof. Anupama Saxena	09406304040
10.	N.S.S. Coordinator	Prof. Pratibha J Mishra	94137-60046, 78694-22622, 07752-260484
11.	Professor Incharge Campus security Management	Prof. B. S. Rathore	07587472651
12.	Dean, School of Studies in Engineering & Technology	Dr. Shailendra Kumar	260429
13.	Director, Institute of Technology	Dr. Shailendra Kumar	260429
14.	Deputy Registrar (Administration)	Mr. R. K. Soni	260036
15.	Deputy Registrar (Exam)	Dr. Sampoornanand Jha	260490 / 260003 / 260000
16.	Deputy Registrar (Store)	Mr. Suraj Mehar	07752-260381, 0 9301010198
17.	HOD (Civil Engineering)	Dr. Shailendra Kumar	260429
18.	HOD (Computer Science and Engineering)	Dr. Manish Shrivastava	260456
19.	HOD (Information Technology)	Dr. Amit Khaskalam	260454
20.	HOD (Electronics & Comm. Engineering)	Mrs. Bhawana Shukla	260458
21.	HOD (Industrial & Production Engineering)	Dr. Mukesh Singh	260453
22.	HOD (Chemical Engineering)	Mr. Neeraj Chandraker (In-Charge)	260457

23.	HOD (Mechanical Engineering)	Dr. Rajesh Kumar Bhushan	086024-03633
24.	Adm. warden , Girl's Hostel	Dr. Rashmi Agrawal	09179444732
25.	Warden-1, Girl's Hostel	Dr. Seema Rai	09406211523
26.	Warden-2, Girl's Hostel	Dr. Renu Bhatt	07389451727
27	Warden-3, Girl's Hostel	Dr. Arti Srivastava	07489965977
28	Matron- 1, Girl's Hostel	Ms. Geeta Sahu	08234003308 Girls Hostel office 07752-260462
29	Matron- 2, Girl's Hostel	Mrs. Janaki Sahu	09009146267
30	Warden -1 (Resident warden S.V.B.H) Boy's Hostel	Mr. T.R. Ratre	090981-46109, 07752-260466
31	Warden - 2 Boy's Hostel (S.V.B.H)	Mr. Abhishek Awasthi	094252-30525, 07752-260466
32	Warden - 2 Boy's Hostel (S.V.B.H)	Mr. Saurabh Meshram	07828245128
33	Warden - 3 Boy's Hostel (B.H. Type-II IV)	Mr. Agnivesh Pandey	096912-85190, 07752-213203 07752-213204
34	Warden - 4 Boy's Hostel (B.H. Type-II IV)	Mr. Shrawan Patel	094241-33622, 07752-213203 07752-213204
35	Boy's Hostel Office	--	07752-260466
36	Boy's Hostel Main Gate	--	07752-260479
37	Medical doctor	Dr. A. Mandal	094255-46165 07752-260427
38	Ambulance	Mr. Yogeshwar Tiwari	094255-42612
39	Health Centre University -	---	07752-260427
40	University Guest House	---	07752-260024
41	Assistant Workshop superintendent	Anulal Mahato	09425535122
42	Training and Placement officer	Mr. Premnath Kamlesh	09479218765 (Mob)
43	University Engineer	Er. Md. A. Hussain	07752-260491, 094790-01658
44	Public Relation Officer	Dr. Satyesh Bhatt	09971085666
45	Asstt. Librarian (Institute of Technology)	Mr. Afsa Ansari	07752-260007

46	Sports Officer (Institute of Technology)	Mr. Ratin Jogi	09827923220
47	Assistant Security Officer	Mr. Suraj Singh	09302408561
48	SC / ST Cell	-	07752-260053
49	DSW (Office)	-	07752-260204, 260013
50	Bank of India	-	07752-260073
51	Punjab National Bank	-	07752-260034

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B. STAFF

Name	Designation	Telephone/Mobile No.
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Mr. Indresh Mishra	Lab Attend	9926111784
Mr. Meera Delwar	Office Superintend	9827467343
Mr. Salik Sahu	MULTI TASKING STAFF (MTS)	9993738754

WELL EQUIPPED LABS

CHEMICAL ENGINEERING DEPARTMENT

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR

DEPARTMENT OF CHEMICAL ENGINEERIN