REGULATIONS
Relating to

B.Tech. (Hons.) Degree

1. Introduction

The provision contained in these Regulations will govern the conditions for imparting courses of instructions, conducting examinations and evaluation of students' performance leading the 4-years courses in Engineering/Technology leading to the award of B.Tech (Hons.) degree.

This regulation is effective from the start of the academic session 2010-2011.

1.1 **Disciplines :** The disciplines in which the courses of studies for the B.Tech. (Hons.) degree are :

1. Civil Engineering
2. Computer Science and Engineering
3. Electrical Engineering
4. Electronics Engineering
5. Mechanical Engineering
6. Metallurgical Engineering and Materials Science
7. Production Engineering and Management

1.2.1 The provisions of this Regulation shall also be applicable to any new disciplines that are introduced from time to time and added to the list in section 1.1

1.2.2 The Board of Governors may, on the recommendation of the Senate, change any or all parts of this Regulation at any time considered appropriate by the Senate.

2. Academic Calendar

2.1 The academic session is divided into two semesters, an Autumn Semester (July – December) and a Spring Semester (December – May).

2.2 The Senate – approved schedule of academic activities for a session, inclusive of dates for registration, mid – semester and end – semester examinations, inter – semester breaks etc, shall be laid down in the Academic Calendar for the session. The Academic Calendar shall strive to provide for a total of about 90 working days in each semester, and the actual contact period load should be about 80 days of actual class room instruction with the balance being used for mid and end semester examination.

3. Admission

3.1 Admission to all courses will be made in the Autumn Semester of each session, at the First Year level, through a Joint Entrance Examination (JEE) conducted by CBSE under the supervision of Joint Admission Board which comprises of representatives from all the NITs.

3.2 Besides the successful AIEEE candidates, specified number of foreign nationals and Indian nationals residing abroad for at least a period of 5 years, satisfying the norms approved by the Senate and selected by the Joint Admission Board in accordance with the policy laid down by the Government of India may be admitted directly to the first year of any of the courses covered by this Regulation.

3.3 In special cases the Institute may admit students to a course on transfer from other NITs. Such admission may be made at any level considered appropriate except at first year level.

3.4 Provisions of this Regulation do not prevent the Institute from allowing students enrolled in a university in India or abroad to attend specified subjects in one or more semesters without leading to any degree on certain terms and conditions.

3.5 All students admitted to any of the courses including those accepted under clause 3.4 above shall be required to pay at the time of joining and also in subsequent semesters prevalent tuition and other fees as prescribed by the Institute till they are on roll.

3.6 The Institute reserves the right to cancel the admission of any student, and ask him/her to discontinue his/her studies at any stage of his/her career on grounds of unsatisfactory academic performance, irregular attendance in classes or indiscipline.

4. Residence

4.1 The Institute is essentially a residential one and unless otherwise exempted/permitted, every student shall be required to reside in, and be a boarder of a Hall of Residence, to which he/she is assigned.

4.2 The terms and conditions that a student must fulfill during his/her stay in a Hall of Residence are mentioned in **Appendix I.**

5. Attendance

5.1 Attendance in all classes (lectures, tutorials, laboratories, workshops etc.) is compulsory. A student may be debarred from appearing at an examination on ground of unsatisfactory attendance.

5.2 Absence from classes without prior permission will be considered as an act of indiscipline. Such cases will be dealt with in accordance with clause 3.6.

5.3 Detailed rules regarding attendance in classes etc. are given in **Appendix II.**

6. Conduct and Discipline

6.1 Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an institution of national importance.

6.2 Detailed rules regarding conduct and discipline are given in **Appendix III.**

7. Change of Branch

7.1 The students admitted to a Course leading to the B.Tech.(Hons.), in a particular branch will be required to continue in that branch only.

8. Course Structure

The duration of the courses leading to the B.Tech. (Hons.) degree will be 4 years.

8.1 The curricula for the different degree programmes as proposed by the respective departments and recommended by the Undergraduate Programme and Evaluation Committee (UGPEC) shall have to have the approval of the Senate. The departments would also prepare the syllabus of each subject containing the scope of studies and detailed instructions to be imparted which must have the approval of the UGPEC.

8.2 All Subjects would have a lecture – tutorial – experiment/design component (l-t-p) to indicate the contact hours. ‘t’ and ‘p’ components of a subject may be void. All subjects would have a credit count ‘c’. Teaching of subjects would be reckoned in terms of credits. Every subject would have a list of subjects (may be void) as its prerequisite. A student who has qualified in all the subjects in the prerequisite would be allowed to register in the subject. The teacher concerned would have the prerogative to waive the prerequisite for a student if he/she is satisfied through a test that the student otherwise have gained sufficient proficiency to take up the subject. Subject to availability a student, irrespective of his/her level or discipline of study, may be allowed to take a subject including an M.Tech. subject as an elective, breadth or additional subject, defined subsequently in this section, if he/she satisfies its prerequisite.

8.3 a) Every student in the first year is required to register in the Extra Academic Activity (EAA) during the first two semesters.

b) Except as stated in clause 8.4b(iv) below

(i) All first year Indian students will register in the NSS.

(ii) Foreign nationals will register in the NSS.

(iii) Physically handicapped will register in the NSS.

(iv) Any student who is proficient in sports may permitted to register in the NSO.

8.4 During the next two semesters also the students will be required to register for one of the Extra Academic Activities. Students may choose any one of the following activities : NSS or any sports/athletic activities of NSO as may be recommended by the President, Technology Students' Gymkhana, and approved by the Senate.

8.5 The remaining course work requirements will be different for the respective degree courses. The requirements would be detailed out in the curriculum and syllabi for each of the discipline as approved by the Senate. The overall structures for the different degrees are given below :

To get a B.Tech. (Hons.) degree a student has to fulfill (i) the depth requirement corresponding to the discipline, (ii) the breadth requirement and (iii) HSS, IEM and IT subject requirements.

8.5.1 Depth Requirement : The depth requirement would be specified by the department and would include (a) Basic science requirements, (b) Engineering science requirements, (c) Other requirements (e.g. workshops, engineering drawing and graphics etc.), (d) Professional subjects – both core and electives, (e) Projects and (f) Comprehensive viva – voce.

8.5.2 Breadth Requirement : A student is required to take at least six subject as his/her breadth subjects for which slots would be made available in the curriculum. The breadth subjects must be a subject offered by other discipline but different from the subjects (including electives) enlisted for the requirement for his/her own depth. A student would be free to choose a breadth subject provided it is available in terms of timetable, limitation of class size and his/her eligibility.

8.5.3 Humanities & Social Science, Management, Environmental

Engineering and Information Technology related subject requirements:

At least three HSS elective subjects, two IT subjects and one Management and Environmental Engineering subject would be included in the curriculum of any discipline. Out of these Two HSS elective, one Environment related subject and one IT based design/application subject are to be included in the depth requirement. The other HSS electives, IT electives and Management elective may be included in the breadth requirement.

8.6 Industrial Training and Field work :

The curricula for all B.Tech. (Hons.) would include compulsory industrial training for 8 weeks carrying 2 credits, to be carried out in the summer vacation at end of the sixth semester.

9. Registration

9.1 Every student of the B.Tech. (Hons.) course is required to be present and register in their respective department at the commencement of each semester on the day fixed for and notified in the Academic Calendar.

9.2 A student who does not register on the day announced for the purpose may be permitted, in consideration of any compelling reason, late registration within the next three working days on payment of a prevalent additional late fee as prescribed by the Institute. Normally no late registration shall be permitted after the third working week from the scheduled date.

9.3 Only those students will be permitted to register who have :

a) cleared all Institute and Hall dues of the previous semesters,

b) paid all required prescribed fees for the current semester, and

c) not been debarred from registering for a specified period on disciplinary or any other ground.

***Note* : The GPA for a set of p subjects will be calculated as follows :**

$$\text{GPA} = \sum_{i}^{p} c_i g_i \Big/ \sum_{i}^{p} c_i$$

i = 1 i = 1

where 'c_i' is the number of credits allotted to a particular subject i in the set, and 'g_i' is the grade – point carried by the letter grade awarded to the student in that subject i.

9.4 From the third (Autumn) Semester onwards in any Autumn (Spring) Semester:

a) Students who have passed in all the subjects of previous Autumn (Spring) semesters shall register for subjects as specified in the curricula of the concerned discipline.

b) Students who have failed in one or more subjects (henceforth called *backlog subjects*) in the previous Autumn (Spring) Semesters must first register in as many of these backlog subjects as are offered in that Semester provided the time – table permits before registering in any new subject. However, total credits would not be allowed to exceed more than 32. At the same time backlog papers of **only one semester** only will be allowed to register in addition to normal credits of current semester.

c) Student who have a backlog in a breadth or an elective subject may register in another breadth or an elective subject from and within the same group of electives offered in the Semester concerned.

9.5 A student who has been debarred from appearing at an examination either i) as per recommendation of the subject teacher for unsatisfactory attendance or ii) by the Institute as a measure of disciplinary action or iii) for adopting malpractice at an examination, and consequently awarded a grade 'X', may re – register for the subject(s) after the term of the debarment expires, provided that other provisions of this regulations do not prevent him.

9.6 With the concurrence of the Faculty Adviser a student may be allowed to change his/her registration of subjects within one week from the day of registration.

9.7 A pre - registration of the students in all the subjects including Breadth and Additional subjects for the ensuing semester would be conducted in the current semester during a time slot to be fixed in the academic calendar. All pre – registration would be confirmed during the normal registration time.

10. Grading System

10.1 As a measure of students' performance a 7-scale grading system using the following letter grades and corresponding grade points per credit, shall be followed :

Performance	**Letter grade**	**Grade point per credit**
Outstanding	O	10
Excellent	A	9
Very good	B	8
Good	C	7
Average	D	6
Below average	E	5
Poor	P	4
Very poor	F	0
Incomplete	I	----

In addition, there shall be two transitional grading symbols which can be used by the examiners to indicate the special position of a student in a subject :

I – for 'Incomplete assessment'

X – for 'Debarred'

10.2 A Semester Grade Point Average (SGPA) will be computed for each semester. The SGPA will be calculated as follows :

$$SGPA = \sum_{i=1}^{n} c_i g_i \Big/ \sum_{i=1}^{n} c_i$$

Where 'n' is the number of subjects registered for the semester, 'c_i' is the number of Credits allotted to a particular subject, and 'g_i' is the grade –

points carried by the letter corresponding to the grade awarded to the student for the subject. SGPA will be rounded off to the second place of decimal and recorded as such. The SGPA would indicate the performance of the student in the semester to which it refers.

10.3 Starting from the second semester at the end of each semester S a Cumulative Grade Point Average (CGPA) will be computed for every student as follows :

m m

$$\text{CGPA} = \sum_{i=1} c_i g_i \quad \sum_{i=1} c_i$$

Where 'm' is total number of subjects the student has registered from the first semester onwards up to and including the semester S, 'c_i' is the number of Credits allotted to a particular subject s_i and 'g_i' is the grade – point carried by the letter corresponding to the grade awarded to the student for the subject s_i. CGPA will be rounded off to the second place of decimal and recorded as such. The CGPA would indicate the cumulative performance of the student from the first semester up to the end of the semester to which it refers. The CGPA, SGPA and the grades obtained in all the subjects in a semester will be communicated to each student at the end of every semester.

For determining the *inter se* merit ranking of a group of students, Only the rounded off values of the CGPAs will be used.

10.4 When a student gets a grade 'I' for any subject(s) during the semester, the SGPA of that semester and the CGPA at the end of that semester will be tentatively calculated ignoring this (these) subjects. After the 'I' grade(s) has (have) been converted to appropriate grades, the SGPA and CGPA for that semester will finally be recalculated after taking into account this (these) grade(s).

10.5. When a student gets the grade 'F' in any subject during a semester, the SGPA and the CGPA from that semester onwards will be tentatively calculated, taking only 'zero point' for each such 'F' grade. After the 'F' grade(s) has/have been substituted by better grades during a subsequent semester, the SGPA and the CGPA of all the semesters, starting from the earliest

semester in which the ‘F’ grade has been updated, will be recomputed to take this change of grade into account.

11. Assessment of Performance :

11.1 There will be continuous assessment of a student’s performance throughout the semester and grades will be awarded by the subject teacher/co-ordination committee formed for this purpose. This constitution of the co-ordination committee is given in **Appendix IV.**

11.2 a) For arriving at a grade obtained by a student for a particular subject, initially a numeric marks obtained by the student out of 100 (hundred) is to be determined. For subjects where the laboratory component (p-component) is non-zero, separate marks, each out of 100 (hundred), in the theory component (l- & t-components) and the laboratory component are to be ascertained first. Next the failure cases (that is, the cases of student obtaining ‘F’ grade) are to be determined as explained in *Appendix VI*. A composite marks of the subject out of 100 is then to be computed by taking appropriate contribution of theory component and the laboratory component as elucidated in **Appendix V.**

b) Once the numeric mark is obtained, the same is to be converted to letter grade following the guidelines given in **Appendix VI.**

c) For subject in which the theory component is greater than 1 (one), the subcomponents and the respective weights assigned to these are given below.

Subcomponent	**Weight**
Teacher’s Assessment (T.A.)	20 %
Mid-Semester Examination	30 %
End-Semester Examination	50 %

d) For assigning marks in Teacher’s Assessment (T.A.) performance in home assignments, class- tests, tutorials, viva-voce, attendance etc. are to be considered. At least two class tests are to be conducted for a subject. The weights of different subcomponents of T.A. are to be announced by the teacher at the beginning of the Semester.

e) For subject in which the theory component 1 (one), there would be no Mid- Semester or End-Examinations. The marks of the theory component would be decided by performance in class-tests, home assignments, tutorials (if any); viva-voce, attendance etc. at least two class tests are to be conducted for the theory components of such a subject. The weights of different subcomponent are to be announced by the teacher at the beginning of the semester.

f) For assigning marks in the laboratory component (p-component) the relevant subcomponents that are to be considered are: day-to-day work, regularity, tests (at least two must be conducted), assignments, viva-voce etc. Percentage weight of the different subcomponents in deciding the final marks are to be announced at the beginning of the Semester.

11.3 The eight-week industrial training undergone by the students in the summer vacation after the sixth semester would be assessed within five weeks after the commencement of the seventh semester. The students are required to submit a written report on the training received and give a seminar, on the basis of which a grade would be awarded. The students are also required to submit to Head of the Department a completion certificate in the prescribed form the Competent authority of the organization where the training was received, without which he/she would not be assessed.

11.4 Assessment of project work

a) Performance in the various activities involved in the project would be assessed individually at the end of each semester in which it is being carried out as per the curriculum. The students are require to submit a written report at the end of the semester. The Head of the Department would appoint a project evaluation broad for the purpose of assessment. The different components of evaluation and the weights assigned to these components are depicted below:

i) Supervisor's assessment : 40 %

ii) Project Report/Thesis : 20 %

(to be assessed by the board)

iii) Evaluation Board's assessment : 40 %

The student is required to give a seminar on the project work done. The evaluation board would conduct the viva – voce. Dates for conducting the seminar and the viva voce, to be held within ten days after the end – semester examination, would be announced in the academic calendar

b) If a student due to non – completion of the project work cannot submit the final project report at the end of eighth semester for B.Tech. (Hons.) and does not appear before the evaluation board for the viva voce on the date fixed by the department in conformity with the academic calendar, may be granted extension of time not exceeding two months on the following conditions:

i) He/she would be awarded one grade lower than the grade obtained by him/her and

ii) He/she would be deemed to have completed the requirements for the degree if applicable in the

succeeding session.

11.5 The Head of the Department would constitute the Viva Voce Board(s) for conducting the comprehensive viva voce examination as per the requirement of the curriculum. The board would decide the relative weight of the different aspect of the viva voce and decide the grade to be awarded to the students. The dates of the viva voce, to be conduct within ten days after the previous end-semester examination, would be announced in the academic calendar.

12. Examination

12.1 The Academic Section of the Institute will centrally conduct the Mid – Semester and the End - Semester Examinations in respect of the theory component of the subjects unless otherwise permitted.

12.2 i) A student will be issued an Admit Card for appearing in an examination, only if he/she has :

a) attendance record to the satisfaction of the teachers in the theory and laboratory classes and has completed the assignment works given.

b) paid all Institute and Hall dues of the semester.

c) not been debarred from appearing in the examination as a result of disciplinary proceedings.

ii) A student may be debarred from appearing at the Mid – Semester or End – Semester Examination on the report of a teacher/chairman, co-ordination committee, if his/her

a) attendance at lecture/tutorial/laboratory classes has not been satisfactory during the period, and/or,

b) performance in the assignment works during the semester has not been satisfactory.

12.3 i) Class tests, mid – semester examination, assignment, tutorials, viva - voce, laboratory assignments, etc., are the constituent components of continuous assessment process, and a student must fulfill all these requirements as prescribed by the teacher/co-ordination committee of the subject. If due to any compelling reason (such as his/her illness, calamity in the family, etc.) a student fails to meet any of the requirements within/on the schedule date and time, the teacher/co-ordination committee in consultation with the concerned Head of the Department may take such steps (including conduction of compensatory tests/examinations) as are deemed fit.

ii) a) Appearing in the end – semester examination in the theory component of a subject is compulsory for a student. Unless exempted as per clause 12.3ii)b) stated below, if a student fails to appear in the end – semester examination he/she will be assigned an 'F' grade in the subject and will not be permitted to register in the summer quarter or appear at the supplementary examination for the subject as stipulated in clauses 12.8 & 12.10, respectively.

b) However, if a student misses the end – semester examination due to a compelling reason like serious illness of himself/herself or a calamity in the family, he/she may appeal to the Dean, Students' Affair, through his/her Head of the Department for permitting himself/herself to register in the summer quarter or appear at the supplementary examination(s), as the case may be apply. A sub – committee of the Undergraduate Program & Evaluation Committee consisting of the following members may, after examining the documents and being convinced about the merit of the case, recommend permitting him/her to register in the summer quarter and/or appearing in the supplementary examination(s) *with full credit* condoning his/her absence :

i) The Dean of Students Affairs - Chairman

ii) The Dean of Academic Affairs

iii) The Institute Doctor or a Doctor recognized for the purpose by the Institute

iv) The Deputy Registrar (Academic) - Secretary

12.4 Students will be permitted to appear in the examination in only those subjects for which they have register at the beginning of the semester and has not been debarred.

12.5 The final grades awarded to the students in a subject must be submitted by the teacher/chairman, co-ordination committee, within seven days from the

date of holding the examination to the concerned Head of the Department for onward transmission to the Assistant/Deputy Registrar (Academic).

12.6 The evaluation of performance in the Extra Academic Activities (EAA) will be done by the authorities conducting these. The grades will be communicated to
the Assistant/Deputy Registrar (Academic) by the following authorities through the co-ordinator of EAA :

NSS/NSO : Head NSS / Dean (Student Affairs)

12.7 Any change of grade of a student in a subject, consequent upon detection of any genuine error of omission and/or commission on part of the concerned teacher, must be approved by the Departmental UG Committee and must be forwarded by the teacher/chairman, co-ordination committee, through the Head of the concerned Department within 20 (twenty) days from the date of commencement of the next Semester.

12.8 For the benefit of and as a process of learning by the students, the scripts after correction of all class tests, mid – semester examinations, assignments etc. would be shown to the students within 4 weeks from the date of tests/examinations. The scripts of the end – semester examinations are to be shown by one day before the date of submission of grades to the faculty advisor. The date of submission of grades will be mentioned in the academic calendar.

12.9 With a view to assist the students, who failed in one or more subjects in the autumn and/or spring semester in a year, a Summer Quarter will be conducted during the immediately following summer vacation for making up their deficiency and improve the performance.

The regulations for running the Summer Quarter are given in **Appendix IX.**

12.10 In order to provide an additional opportunity to the students who failed (obtained an ‘F’ grade) in one or more subjects *due to not being able to source higher than the cut – off marks in the theory components* in either the autumn and/or the spring semester in a year, Supplementary Examinations equivalent to the end – semester examination arranged centrally by the Academic Section, will be conducted in the month of July (before commencement of the next session) every year. Regulations relating to the Supplementary Examination are given in **Appendix VIII.**

12.11 A student must complete B.Tech (H) degree programme within a maximum period of five years from date of his / her admission to the Institute. In special case the senate may, on the recommendation of the DAC and the UGPEC extend the total time limit for completion of the degree programme up to six years. This will be applicable with the condition that :

(i) the student will be allowed to stay in the Institute Hall of residence for first four academic session only from the date of admission to the Institute.

(ii) He / She will be allowed to register the papers including backlog, not exceeding the total credits of 32 in a semester. At the same time the backlog paper of only one semester will be permitted in a semester.

(iii) No special examination will be conducted for such students in any case to clear the backlog papers.

13. Graduation Requirement

13.1 In order to qualify for a B.Tech.(Hons.) Degree of the Institute covered under these Regulations a student must :

a) Complete all the credit requirements for the degree, as laid down in the prescribed curriculum of the discipline, with a minimum grade 'P' scored in every subject.

b) Obtain a CGPA of 6.00 or higher at the end of the semester in which he/she completes all the requirements for the degree.

c) Have cleared all dues to the Institute, the Hall of Residence, the Library and the Department.

13.2 The minimum total credit requirements that has to be satisfactorily completed for the award of a degree will vary between 200 – 230 depending on the course structure of various departments or as decided by the senate from time to time.

13.3 Normally a student should complete all the requirements consecutively in eight semesters for B.Tech.(Hons.) degree.

13.4 A student, whose academic records at the end of any semester clearly indicate that he/she will not be able to qualify for the degree for which he/she had been admitted within the limits of time specified in clause 13.3 above, shall have to discontinue studies and leave the Institute when asked to do so.

14. Withdrawal from the Institute

14.1 A student who has been admitted to a degree course of the Institute may be permitted to withdraw temporarily for a period of one semester or more from the Institute on grounds of prolonged illness or acute problem in the family which compelled him to stay at home, provided :

a) He/She applies to the Institute within 15 days of the commencement of the semester or from the date he/she last attended his/her classes whichever is later, stating fully the reason for such withdrawal together with supporting documents and endorsement of the father/guardian.

b) The Institute is satisfied that, inclusive of the period of withdrawal, the student is likely to complete his requirements for the degree within the time limits specified in clause 13.3.

c) There is no outstanding dues or demands from him/her by the Institute/Hall/Department/Library/Gymkhana/NSS.

14.2 A student who has been granted temporary withdrawal from the Institute under the provisions of clause 14.1 will be required to pay the tuition fee and other essential fees/charges for the intervening period till such time as his/her name is borne on the Roll List.

14.3 A student will be granted only one such temporary withdrawal during his/her tenure as a student of the Institute.

14.4 A student who has completed/attended the First and the Second semesters of studies in this Institute may, on grounds of health, be permitted to apply for transfer to any other NIT. If the Director approves such an application may be forwarded by the Dean of Academic Affairs to the other NIT concerned for their consideration. The decision of the competent authority of the other NIT in the matter shall be final.

15. Institute Medals and Prizes

The senate shall have the authority to Institute medals and prizes as it deems fit from time to time

16. Merit – cum – Means Scholarships

These scholarships are awarded from the Institute funds. Rules pertaining to the award of Merit – cum – Means scholarships are stated in Appendix IX.

17. Relaxation

The Senate may, under exceptional circumstances, consider any case of a student having a minor deficiency in respect of any of the requirements stated in these Regulations and relax the relevant provision of these Regulations based on the merit of the case. The grounds on which such relaxation is granted shall invariably be recorded and cannot be cited as precedence.

APPENDIX I
RULES RELATING TO RESIDENCE REQUIREMENTS

Following are the detailed rules governing residence requirements of students :

a. Hall of residence will be provided for four academic only from the date of admission to the Institute. If a student do not complete the four years degree course within this period, he will have to leave the Institute hall of residence.

b. The mess of each Hall of Residence shall function as a single integrated unit and shall not, under any circumstances be sub – divided into any kind of groups or sub – groups.

c. Under special circumstances, the Director/Dean of Students' Affairs may permit a student to reside with his Parent/Guardian in the Institute Campus or within a reasonable distance from the Institute. Such a student shall, however, be attached to a Hall of Residence and will be required to pay seat rent according to rules, and Hall establishment charges fixed by the Hall Management Committee (HMC) and the Warden of the hall. However, this permission may be withdrawn at the discretion of the Institute, at any time considered appropriate without assigning any reason.

d. No married accommodation shall be provided to any student of the undergraduate courses.

e. No student shall come into or give up the assigned accommodation in any Hall of residence without the prior permission of the Chairman, HMC.

f. A student shall reside in a room allotted to him/her and may shift to any other room only under the direction/permission of the Warden.

g. Students shall be required to make their rooms available whenever required for inspection, repairs, maintenance or disinfecting and shall vacate the rooms when leaving for the vacations/holidays.

h. Students shall be responsible for the proper care of the furniture, fan and other fittings in the rooms allotted to them and shall generally assist the Warden in ensuring proper use, care and security of those provided in the Halls of common use of all students.

i. Students will be responsible for the safe keeping of their own property. In the event of loss of any personal property of a student due to theft, fire or any other cause, the Institute shall accept no responsibility and shall not be liable for payment of any compensation.

k. Engaging personal attendance, keeping pets and use of appliances like electric heater, refrigerator etc. by a student in the Hall of Residence are prohibited.

l. All student must aside by the rules and regulations of the Hall of Residence as may be framed from time to time.

APPENDIX - II

RULES REGARDING ATTENDANCE

Following are the rules relating to attendance at classes :

1. Attendance in all classes (lectures, tutorials, laboratories, workshops, EAA including its related camps and other publicized activities etc.) are compulsory. A student may be debarred from appearing at an examination on the ground of unsatisfactory attendance.

2. The teacher concerned may condone absence from classes for a very short period due to unavoidable reasons provided he/she is satisfied with the explanation.

3. a) If the period of absence is for a short duration (of not more than two weeks) application for leave shall have to be submitted to the Head of the Department concerned stating fully the reason for the leave requested for along with supporting document(s). the Head of Department will grant such leave.

   b) Absence for a period not exceeding two weeks in a semester due to sickness or any other unavoidable reason for which prior application could not be made may be condoned by the Head of the Department provided he is satisfied with the explanation.

4. If the period of absence is likely to exceed two weeks, a prior application for grant of leave will have to be submitted through the Head of the Department to the Dean, Academic Affairs, with the supporting documents. The decision to grant or condone such leave shall be taken by the Dean (Academic Affairs) only after joining his / her Institute and producing fitness certificate within a week with proper recommendation of the Head of the Department.

5. It will be the responsibility of the student to get his absence from classes condoned by the appropriate authority.

6. In any case the minimum attendance in order to make the student eligible to appear in end semester examination should not fall below 75%. However, in certain cases due to compelling reason like serious illness of his / her, or natural calamity or death case in the family or any unforeseen reason, it may be relaxed up to 60% with permission from the Director.

6. A student must intimate his/her absence to the Warden of the Hall in which he/she is residing, before availing of any leave. Failing to do so will be

construed as breach of discipline and will be dealt with as per provisions in Appendix III.

APPENDIX III
RULES REGARDING CONDUCT AND DISCIPLINE

Following rules shall be in force to govern the conduct and discipline of all students :

1. Students shall show due respect to the teachers of the Institute, the Wardens of the Halls of Residence, the Sports Officers of Gymkhana and the Officers of the National Social Service; proper courtesy and consideration should be extended to the employees of the Institute and of the Halls of Residence. They shall also pay due attention and courtesy to visitors.

2. Students are required to develop a friendly relationship with fellow students. In particular, they are expected to show kindness and consideration to the new students admitted to the Institute every year. Law bans ragging in any form to any body – acts of ragging will be considered as an offence and gross indiscipline will be severely dealt with.

3. The following acts of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures:

   - **Ragging**
   - Furnishing false statement of any kind in the form of application for admission or for award of scholarship etc.
   - Displaying lack of courtesy and decorum; resorting to indecent behavior anywhere within or outside the campus.
   - Willfully damaging or stealthily removing any property/belongings of the Institute, Hall or fellow students.
   - Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.
   - Adoption of unfair means in the examinations.
   - Organizing or participating in any group activity in company with others in or outside the campus without prior permission of the Dean of Student' Affairs.
   - Mutilation or unauthorized possession of library books.
   - Resorting to noisy and unseemly behavior, disturbing studies of fellow students.
   - Not intimating his/her absence to the warden of the hall before availing any leave.

   Commensurate with the gravity of the offence, the punishment may be reprimand, fine expulsion from the Hall, debarment from an examination, rustication for a specified period or even outright expulsion from the Institute.

4. For an offence committed (a) in a Hall of Residence, (b) in the Department or a classroom and (c) elsewhere, the Warden, the Head of Department and the Dean of Students' Affairs, respectively, shall have the authority to reprimand or impose fine or take any other suitable measure.

All cases involving punishment other than reprimand shall be reported to the Chairman of the Standing Disciplinary Committee.

5. (a) All major acts o indiscipline, which may have serious repercussion on the general body of students, and/or which may warrant a uniform and more formalized nature of investigation, shall be handled by the Standing Institute Disciplinary Committee appointed by Senate. The standing Disciplinary Committee consists of the following ex-officio and other members:

1) Dean of Students' Affairs-*Chairman*

2) Chairman, Hall Management Committee

3) Warden of the Hall of Residence of which the student concerned is a boarder

4) One member of faculty nominated by the Senate, by rotation for two years.

5) Student Vice President, Technology Students' Gymkhana

6) One of the student representatives in the Senate, to be nominated by the Dean, Students' Affairs, for one year

7) The Deputy Registrar (Academic) –*Member Secretary*

In addition, the Chairman may invite any other person(s) to be associated with the proceedings of a particular case, if he/their participation is considered necessary in disposing of the matter.

b) Recommendation of the committee, which will include the suggested punishment in cases of guilt proven, will be forwarded to the Chairman Senate for necessary action.

6) Cases of adoption of unfair means in an examination shall be dealt with by the committee on Examination Malpractice consisting of the following members :

1. Professor – in – Charge of Examination - Chairman

2. Head of the Department to which the reported student belongs - Member

3. The invigilator reporting the case
- Member

4. The Invigilator–in–Charge of the Examination Hall concerned - Member

5. The Paper – setter concerned
- Member

6. & 7. Two members of faculty nominated by the Undergraduate

Program & Evaluation Committee for a term of two years
- Members

8. The Assistant/Deputy Registrar (Academic)
- Secretary

The Committee shall recommend appropriate measures in each case to the Chairman of the Senate for awarding the punishment. The punishment may be reprimand, reduction of marks to certain percentage of that subject, cancellation of examination of that particular subject, cancellation of all the papers of that examination, rustication for a specified period (one year, two years), or even outright expulsion from the Institute.

APPENDIX - IV

CO – ORDINATION COMMITTEES FOR U.G. STUDIES

Composition :

One Co-ordination Committee would be constituted for each subject taught by more than one teacher of one or more Department/Centres. Each committee would consist of all the teachers who are involved with the teaching of the subject during the semester.

One of its members would be nominated by the Head of that Department, under whose name the subject is being offered, to act as its Chairman.

Tenure :

The semester in which the subject is being offered.

Functions :

i) To lay down the course plan for the subject.

ii) To co-ordinate instructions and progress of teaching in the subject and to ensure that the full syllabus is covered.

iii) To review periodically the performance of students who have registered in the subject.

iv) To forward the results of the examinations and the final grades obtained by each student taking the subject to the concerned Head of the Department.

v) To moderate the question papers on the subject and ensure that the syllabus is well covered by the question papers.

Frequency of Meetings :

Each Co-ordination Committee shall meet at least four times during the semester.

APPENDIX - V

Percentage Contribution

l – t - p	**Credit**	**Theory**	**Laboratory**
		(l – t Component)	**(p – Component)**
4 – 0 – 6	8	50	50
3 – 0 – 6	7	40	60
4 – 0 – 3	6	70	30
3 – 1 – 3	6	70	30
1 – 0 – 8	6	20	80
3 – 1 – 2	5	80	20
3 – 0 – 3	5	60	40
3 – 1 – 0	4	100	00
3 – 0 – 2	4	75	25
2 – 0 – 3	4	50	50

1 – 0 – 5	4	25		75
3 – 0 – 0	3	100	00	
2 – 0 – 2	3	70		30
1 – 0 – 3	3	30		70
1 – 0 – 2	2	50		50\

APPENDIX - VI

GUIDELINES FOR AWARD OF LETTER GRADES

1. In general there shall be no rigid marks – to – grade linkage. Difficulty levels of the examinations, tests, assignments, viva-voce and other factors that contributed to the final marks are to be considered by the teacher/co-ordination committee of a subject while converting marks into letter grades.

2. a) The grades F and Ex are to be considered as bench mark grades.

   b) For subjects which have a laboratory component (p-component), to secure any grade higher than 'F' a student has to achieve individually more than the cut-off marks in both the theory component and the laboratory component. Otherwise, he/she has to achieve higher than the cut-off marks in the theory component alone.

   c) The range of cut-off marks below which a student would be assigned an 'F' grade is 30 – 35 for the theory component and 35 – 40 for the laboratory component, the exact cut-off marks is to be decided by the teacher/co-ordination committee.

   d) The exceptionally brilliant performance is to be assigned an 'Ex' grade. Even the best student of any class needs to be good enough to be awarded the 'Ex' grade.

3. In the case of a relatively large class and/or classes where the performance level depicts more or less a normal distribution :

   a) The average performance (around mean value of marks) is to be assigned 'C' grade. However, if by teacher's/co-ordination committee's perception the general level of the class is considered to be appreciably high, the average performance may be assigned 'B' grade.

   b) All other marks to grade conversion are to be done relatively with respect to the average performance in between (but excluding) the F and Ex grades, which have already been assigned, by choosing appropriate boundary marks between grades.

c) Normally, in a reasonably large class of students distribution of grades is expected to be as follows :

Ex : < = 10 %

A : 10 – 20 %

B,C,D : 20 – 35 %

P : 10 – 25 %

F : < = 5 %

4. In the case where a student appears in the supplementary examination or attends summer quarter, the conversion from marks to grade would be done applying the same norm as was framed for the original class.

5. For classes where excessive bunching occurs resulting in all most all the marks tending to cluster in to same category, conversion from marks to grade may be done using the table given below, where 'm' stands for the marks obtained. However, the teacher may, on his/her perception of the difficulty level of assessment process undertaken, alter the boundary (cut-off) marks by +/- 5 marks.

Range of marks	**Grade**
M >= 90	O
80 <= m < 90	A
70 <= m < 80	B
60 <= m < 70	C
50 <= m < 60	D
40 <= m < 50	E
35 <= m < 40	P
m < 35	F

6. Co-ordination committee would moderate the results of the different sections of a class if wide disparity in performance across sections were observed.

7. All the requirements for the laboratory component are to be satisfied by a student within deadline set-up by the teacher/co-ordination

committee before the start of the end – semester examination. If a student due to a genuine reason like illness of himself/herself or calamity in the family, cannot complete a particular sub-component, the teacher/co-ordination committee may allocate him/her additional time. In this case an I-grade if needed may temporarily be allocated to the student in the subject. However, the requirement in any case has to be fulfilled within 15 days after the end of the end – semester examination and the grade finalized.

8. There is no provision for supplementary examination or summer quarter in the laboratory component. If a student cannot clear the laboratory component of a particular subject, he/she will be assigned the grade 'F' in that subject and has to reregister in the subject, if permitted, in the immediately following semester in which it is offered.

APPENDIX - IX

RULES RELATING TO SUMMER QUARTERS

1. Introduction

1.1 To enable the undergraduate students to make up deficiencies a Summer Quarter will be organized every year during the summer vacation. *Summer Quarter shall, however, be offered only in the theory components of subjects.*

1.2 The students of 4 – year B.Tech. (Hons.) courses eligible to register for the Summer Quarter, if any is offered.

2. Duration

2.1 The duration of the Summer Quarter shall be seven weeks from around the middle of May till around the end of June. The exact dates for holding the Summer Quarter for a particular session shall be decided by the Senate every year while finalizing the Academic Calendar.

2.2 The attendance requirement for the Summer Quarter shall be the same as for a regular semester. A student who does not satisfy the norms will not be allowed to appear at the examination.

3. Eligibility

3.1 Only those students will be permitted to register themselves for a subject offered in the Summer Quarter who have cleared all Institute and Hall dues till date and have paid the necessary fees and Mess Advances for the Summer Quarter for which they are registering.

3.2 A student will be eligible to register in a subject if he/she actually appeared at the last end – semester examination in that subject and obtained the grade 'F'.

3.3 A student, who could not appear at the end semester examination due to self – illness or calamity in the family, will also be eligible to register for the subjects concerned in the Summer Quarter as per clause 14.1 i) b) if his/her attendance was satisfactory in the judgement of the teacher.

3.4 No Supplementary Examination shall be held in a subject that is being offered in the Summer Quarter of the session unless extraordinary circumstances justify it.

4. Registration

4.1 All students intending to join a Summer Quarter must register themselves for the subjects concerned on the day fixed for the purpose. No late registration shall be permitted on any ground.

4.2 A prevalent Summer Quarter registration fee, as decided by the Institute from time to time shall have to be paid along with the application in a prescribed form.

4.3 Registration of students for the Summer Quarter in a subject shall be done by the Faculty Adviser in the Department concerned under the supervision of the Head of the Department.

4.4 The weekly lectures and tutorials of a subject taught in the Summer Quarter shall be twice the corresponding loading it carries during the normal semester. The credits allotted to it shall, however, remain the same.

4.5 A student shall not be allowed to register for more than two subjects during a Summer Quarter.

4.6 Summer Quarter in a subject shall be offered only if at least 5 students register for that subject.

5. Assessment

The teacher offering a particular subject during the Summer Quarter shall

5.1 Take care of all aspects of the theory component of the subject, viz, lectures, tutorials, assignments etc.

5.2 Conduct all class tests, mid – semester examination, end-semester examination viva-voce etc. the end – semester examinations may, however, be centrally arranged.

5.3 Compute the grade as per rules laid down in *Clauses 12.2 (a) through (e) of section 11.* The contribution of the laboratory component, if there is any in the subject, ascertained in the original semester has to be used for computing the numeric marks out of 100.

5.4 The grades awarded to the registered students must be sent to the Assistant/Deputy Registrar (Academic) within 3 days from the date the examination was held.

APPENDIX - VIII

RULES REGARDING SUPPLEMENTARY EXAMINATION

1. Except as specified in Clause 12.3(ii)(b), a student will be eligible to appear in the supplementary examination in a subject if he/she had actually appeared at the last end – semester examination in that subject and obtained the grade 'F'.

2. A student will not be allowed to appear in more than 5 (five) subjects in the supplementary examinations.

3. Intending students must submit their application, countersigned by the

   teacher(s) of the subject(s) or the Head of the Department concerned, along with the necessary fees to the Assistant Registrar (Academic) by the date as announced by a notification.

4. The supplementary examinations shall be held on such dates as laid down in the Academic Calendar for the year or as notified separately.

5. The grade in subject scored by the student appearing in the supplementary examination will be recomputed by substituting the marks of the end – semester in the total marks scored by that scored in the supplementary examination. *Unless exempted as per regulation in clause 14.3 ii) b), a student is entitled only one grade lower than the actual grade thus scored, except that performance grade 'P' remains unaltered*.

6. The final grades awarded to the students must be sent to the Assistant Registrar (Academic) within 3 days from the date the supplementary examination was held.

APPENDIX - XI

RULES FOR THE AWARD OF MERIT – CUM – MEANS SCHOLARSHIPS

The Institute award scholarships on the basis of merit-cum-means to all eligible students of the 4 – year B.Tech.(Hons.) in accordance with the following rules :

1. All students admitted to any of the 4 – year B.Tech.(Hons.), except the students belonging to SC and ST (who are eligible for Post – Metric Scholarship of their respective State Governments) who fulfill the conditions hereinafter appearing shall be eligible for the award of the Merit – Cum – Means (MCM) scholarship.
2. These scholarships will be awarded to not more than 25 % of the students admitted each year to the Undergraduate courses.
3. The value of these scholarships shall be as determined by the Board of Governors from time to time.
4. All MCM scholarship holders will be entitled to exemption from payment of Institute tuition fee. They shall, however, be required to pay all other prescribed fees.
5. (a) The MCM scholarships will be payable for all 12 months of the academic session, from the month of July of one year to the month of June of the following year.

   (b) Scholarships for the month of July shall be paid in full regardless of the date in July when the Institute reopens after the Summer Vacation, provided the student joins the Institute on the prescribed date of registration. Otherwise, the scholarship for the month of July shall be paid on a pro – rata basis.

6. No student will be permitted to enjoy more than one scholarship during the same period. In the event of an awardee becoming eligible for another scholarship from any other source, he will have the option to accept either of the two. In such a case he/she is required to communicate in writing his/her choice to the Dean of Academic Affairs.
7. The initial award of the scholarship and its annual renewal through proper application shall be governed by the following conditions :

   (a) The student satisfies the *merit criterion* laid down for the award of these scholarships.

   (b) The parent/guardian of the student satisfies the *means criterion* laid down for the award of the scholarship.

(c) No disciplinary action has been taken against him/her during the preceding year.

8. The *merit criterion* for the award of the scholarship shall be as follows :

(a) For fresh entrants, the student should have obtained at least 60 % marks in aggregate or a grade corresponding to 60 % marks in the qualifying examination for AIEEE.

(b) For subsequent renewals, the student's performance in the two consecutive semesters of the preceding session, that is, the average of the two SGPAs concerned, as updated after the last supplementary/summer quarter examination, must not be lower than 7.00.

9. The upper limit of annual income as laid down by the Government of India from time to time shall be applicable as the *means criterion* for the award of the scholarships. The income during the financial year completed before the session commences shall be taken into consideration for this purpose.

10. An employer's certificate/copy of the income tax return/income affidavit for the financial year preceding the grant or renewal of the award, as the case may be, shall have to be submitted by the parent/guardian of the student along with the application for the scholarship.

11. In the event of a tie among two or more applicants for the award of the last available scholarship, every student involved in the tie will be awarded the scholarship even if the total number of scholarships exceeds the 25 % limit.

12. The scholarship holder must (a) obey all the regulations laid down in the Appendix – II regarding attendance (b) appear in all the semester examinations except for illness or calamity in the family (to be supported by documents). In case of any breach the scholarship would be terminated.

13. Outstanding Institute and Hall dues, if any, may be deducted at the source and the balance, if any, would be paid to the scholar.

14. Those students who satisfy the specified *means criterion* but are unable to satisfy the specified *merit criterion* may be granted exemption from the payment of tuition fees. The number of such *tuition – free* students shall be restricted t o10 % of the students admitted each year.

NATIONAL INSTITUTE OF TECHNOLOGY JAMSHED PUR
JAMSHEDPUR (JHARKHAND) - 831014

Group – I: CE, EEE, ECE and CSE – Physics Cycle
Group – II: ME, MFG and MME – Chemistry Cycle

FIRST SEMESTER

GROUP – I (CE, EE, ECE and CSE)

SL. NO.	COURSE CODE	COURSE NAME	CREDIT L–T-P	THEORY PRACTICAL
1	PH1101	ENGINEERING PHYSICS	3-1-0	THEORY
2	MA1101	MATHEMATICS- I	3-1-0	THEORY
3	EE1101	BASIS ELECTRICAL AND ELECTRONICS ENGINEERING	3-1-0	THEORY
4	MM110	MATERIAL SCINCE	3-0-0	THEORY
5	CE1101	ENVIRONMENT AND ECOLIGY	3-0-0	LABORATORY
6	ME1103	ENGINEERING GRAPHICS	2-0-2	THEORY+LAB
7	PH1102	ENGINEERING PHYSICS LAB.	0-0-3	LABORATORY
8	EE1102	BASIS ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	0-0-3	LABORATORY
		YOGA/NSS/NCC/LIFE SKILLS	17-3-5	
		TOTAL	25	

GROUP – II (ME, MFG, MME)

SL. NO.	COURSE CODE	COURSE NAME	CREDIT L–T-P	THEORY PRACTICAL
1	CH1101	ENGINEERING CHEMISTRY	3-1-0	THEORY
2	MA1101	MATHEMATICS- I	3-1-0	THEORY
3	ME1101	ENINEERING MECHANICS	3-1-0	THEORY
4	HS1101	ENGLISH FOR COMMUNICATION	3-1-0	THEORY
5	CS1101	COMPUTER PROGRAMMING	2-0-2	THEORY
6	ME1102	ENINEERING MECHANICS LAB.	0-0-3	LABORATORY
7	CH1102	ENGINEERING CHEMISTRY	0-0-3	LABORATORY
8	MF1101	WORKSHOP PRACTICE	0-0-3	LABORATORY
			14-4-7	
		TOTAL	25	

NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR JAMSHEDPUR (JHARKHAND) - 831014

Group – I: CE, EEE, ECE and CSE – Chemistry Cycle
Group – II: ME, MFG and MME – Physics Cycle

SECOND SEMESTER

GROUP – I (CE, EEE, ECE, and CSE)

SL. NO.	COURSE CODE	COURSE NAME	CREDIT L–T-P	THEORY PRACTICAL
1	CH1201	ENGINEERING CHEMISTRY	3-1-0	THEORY
2	MA1201	MATHEMATICS- II	3-1-0	THEORY
3	ME1201	ENINEERING MECHANICS	3-1-0	THEORY
4	HS1201	ENGLISH FOR COMMUNICATION	3-1-0	THEORY
5	CS1201	COMPUTER PROGRAMMING	2-0-2	THEORY
6	ME1202	ENINEERING MECHANICS LAB.	0-0-3	LABORATORY
7	CH1202	ENGINEERING CHEMISTRY	0-0-3	LABORATORY
8	MF1201	WORKSHOP PRACTICE	0-0-3	LABORATORY
			14-4-7	
		TOTAL	25	

GROUP – II (ME, MFG, MME)

SL. NO.	COURSE CODE	COURSE NAME	CREDIT L–T-P	THEORY PRACTICAL
1	PH1201	ENGINEERING PHYSICS	3-1-0	THEORY
2	MA1201	MATHEMATICS- II	3-1-0	THEORY
3	EE1201	BASIS ELECTRICAL AND ELECTRONICS ENGINEERING	3-1-0	THEORY
4	MM1201	MATERIAL SCINCE	3-0-0	THEORY
5	CE1201	ENVIRONMENT AND ECOLIGY	3-0-0	LABORATORY
6	ME1203	ENGINEERING GRAPHICS	2-0-2	THEORY+LAB
7	PH1202	ENGINEERING PHYSICS LAB.	0-0-3	LABORATORY
8	EE1202	BASIS ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	0-0-3	LABORATORY
.			17-3-5	
		TOTAL	25	

National Institute of Technology, Jamshedpur

B.Tech. Course Syllabus

SEMESTER I

Engineering Physics

Electromagnetic Waves: Introduction to del operator, gradient of a scalar, divergence and curl of vectors, Gauss divergence theorem, Stake's theorem, equation of continuity, Introduction to displacement current, Maxwell's Equations, Wave Equation, Plane electromagnetic waves, Poynting's Theorem, Electromagnetic Boundary Conditions, Reflection and Refraction.

Polarization:Unpolarised light, Production of plane polarized light by grid polarizer, Polarization by reflection and Brewster's Law, Malus' Law, Double refraction, quarter wave plate, half wave plate, Production and analysis of various kinds of polarized lights.

Magnetic properties of matter: Dia, Para and Ferromagnetic materials, Magnetic domains, Magnetic Hysteresis, Calculation of Hysteresis loss, Three magnetic vectors, Magnetic circuit. Interaction of Radiation with Matter: Compton Effect and pair production (qualitative).

Laser: Coherent waves and interference, Temporal and Spatial coherence, Metastable states, Optical pumping, Population inversion, spontaneous and stimulated emission, Einstein's A and B coefficients, He-Ne laser.

Wave Mechanics: Failure of classical physics, Qualitative review of relevant experiments, de Brogile waves, Phase and Group velocities, Davisson and Germer experiment, Uncertainty principle, wave function and Schrodinger equation, probability interpretation, Application of time-independent Schrodinger equation -Particle in a box.

Engineering Mathematics-I

Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's theorem with remainders, Indeterminate forms, Concavity and Convexity of a curve, Points of inflexion, Asymptotes and Curvature.

Limit, Continuity and Differentiability of function of several variables, partial derivatives and their geometrical interpretation, Directional derivatives of composite and implicit functions.

Euler's theorem on homogeneous functions, Taylor's expansion of functions of several variables, maxima and minima of functions of several variables, Lagrange's method of multipliers

First order differential equations: Exact, Linear and Bernoulli's form, Second order differential equations with constant coefficients, Method of undetermined coefficients, variation of parameters, Euler's equations, system of differential equations. Review of limit, continuity, differentiability of functions of complex variables, Analyticity of functions, Cauchy- Riemann equations, Harmonic functions. Reduction formula for indefinite and definite integrals of type $\sin^n x$, $\cos^n x$,$\sin^m x \cos^n x$ and their evaluation

Basic Electrical and Electronics Engineering

Electrical circuit: D.C circuit: voltage and current sources, mesh current method, nodal voltage method. Delta star and Star-delta transformation, Thevenin's theorem, super position theorem, Norton's theorem, maximum power transfer theorem

A.C. Circuit: single phase and three phase A.C phasor representation. Electrical Circuit Element's R-L-C, their physical origin based on electromagnetic and electrostatics, R-L, R-C, R-L-C series circuits, sinusoidal study state: power factor, active and reactive power, parallel and series circuits. Delta and star connections, line and phase quantities, single and three phase power measurement A.C Fundamentals, Active, Reactive and Apparent power, Basics of transformers, D.C Machines and Induction motor.

Semiconductor devices: construction, working and V-I characteristics of diode, zener diode, LED, photodiodes, SCR, Diac, Triac and their applications.

Transistors: BJT, FET,MOSFET, Construction, working, type of configuration, V-I characteristics, biasing transistor circuits-fixed bias, emitter bias, feedback bias, voltage divider bias, transistor as an amplifier

Operational amplifier: introduction, parameters application-inverting, non-inverting amplifier unity follower, integrator, differentiator, summing circuit. Introduction of logic gates

Environment and Ecology

Eco-system: Concept of ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries.

Biodiversity and its conservation: Introduction-Definition: Genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of diversity: Consumptive use, productive us, social, ethical, aesthetic and option values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot space of biodiversity, threats to biodiversity: Habitat loss, poaching of wildlife., man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Environment pollution: Causes, effects and control measures of: (a) Air Pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution. (e) Noise pollution. (f) Thermal pollution, (g) nuclear pollution, Solid waste management: causes effects and control measures of urban and industrial wastes, role of individual in prevention of pollution, Pollution case studies, and Disaster management: floods, earthquake, cyclone and landslides.

Solid issues and the environment: From understandable to sustainable development, urban problems related to energy, Water conservation, rain water harvesting. Watershed management, resettlement and rehabilitation of people: its problems and concerns, case studies. Environmental ethics: issues and possible solutions. Climate change, global warning, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies, Wasteland reclamation, consumerism and waste products, Environment protection act. Air (prevention and control of pollution) act, Water (prevention and control of pollution) act, Wild life protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, public awareness.

Material Science

Introduction: Types of materials from structure to property, Crystal structure: Crystalline and non-crystalline materials, Miller indices, Bravias lattices, Lattice direction and planes. Crystal Imperfections: point, line and planer defect. Deformation of material: Recovery re-crystallization and grain growth, Mechanical properties of materials: Tensile, Impact, Fatigue and Creep of metals. Electron theory of Metals: Free electron theory, Zone theory , The dependence of the energies on the wave number, The density of state curves, Conductors and insulators, Semiconductors, Dielectric behavior, Ferro-electricity, Piezoelectricity, Magnetism, Principles of solidification: Nucleation and growth, Homogeneous and heterogeneous nucleation, Phase Diagrams: Phase rule,

isomorphous, eutectic, peritectic, eutectoid and peritectoid transformation, Fe-cementite diagram; Heat Treatment of Steel: TTT diagram, different heat treatment process: Annealing, normalizing and Hardening, Hardenability. Selection of Engineering Materials: Common engineering materials including metals and alloys, ceramics composites, polymers.

Text Book:

1. Materials Science by R.S Khurmi, S. Chand Publication.
2. Materials Science and Engineering by V Raghavan, Eastern Economy Edition PHI publication.

Reference book:

1. Materials Science and Engineering by William Callister, Wiley Publication

Engineering Graphics

Introduction to basic engineering drawing, instruments, sheet layouts, lines, lettering, dimensioning, Projection of points and lines, Projection of Solids, Section of solids, Development of surfaces of solids, Isometric projections, Orthographic projections, Use of CAD software to draw plan, elevation and other views of different objects.

SEMESTER II

Engineering Chemistry

Thermodynamics: Laws of thermodynamics, system, thermodynamic functions, state of a system, equilibrium, enthalpy, work done in different processes, C_p, C_v, adiabatic PVT relations, Carnot cycle, concept of entropy, Clausius-Clapeyron equation & its applications, Maxwell relations, concept of free energy, chemical potential, Maxwell relations.

Electrochemistry and corrosion: Electrochemical cells, origin of electrode potential, standard potential, Nernst equation, EMF series, rechargeable batteries, Types of corrosion, galvanic series, Cathodic and anodic reactions, differential aeration cells, corrosion prevention methods.

Kinetics & Solution Chemistry: Kinetics of chemical reaction, 1^{st}, 2^{nd} order reactions, reversible, consecutive and parallel reaction. Steady state approximations, Arrhenius equation, Chain reactions, photo chemical reactions, Solution chemistry and colligative properties, Real and ideal solutions, Diffusion, Osmosis, Osmotic pressure, Lowering of vapor pressure, Elevation in boiling point, Depression of freezing point, Abnormal molecular weight, Degree of association and dissociation.

Chemical Bonding & Co-ordination chemistry: Bonding models in inorganic chemistry, Molecular orbital theory (MOT), Valance bond theory (VBT), and crystal field theory (CFT), Co-ordination chemistry: Co-ordination number, Chelate effect, EAN rule, splitting of 'd' orbital in octahedral, tetrahedral and square planar complex, Example of Bio-inorganic & metals in biological systems

Industrial chemistry: Polymers: types of polymer, polymerization, applications, and important synthetic polymers. Refractory & ceramics material: Classification, manufacturing and Applications, Water treatment, Air pollution and Control techniques

Engineering Mathematics-II

Linear dependence and independence, rank and inverse of a matrix, solution of algebraic, equations- consistency conditions, Eigen values and Eigen vectors, Hermitian and skew Hermitian matrices,

Convergence of improper integrals, test of convergence, Beta and Gamma functions elementary properties, differentiation under the integral sign.

Series solution, Frobenius Method, Legendre's and Bessel's differential equation, Recurrence formula, Generating functions, orthogonality.

Rectification, double and triple integrals, computations of surfaces and volumes, change of variables in double integrals, Jacobians of transformations

Scalar and vector fields, level surfaces, directional derivative, Gradient, Divergence, Curl, Laplacian, line and surface integrals, theorems of Green, Gauss and Stokes.

Finite differences, Newton's forward and backward interpolation formulae, Central difference interpolation Lagrange's interpolation, Trapezoidal rule and Simpson's $1/3^{rd}$ rule of integration, Solution of polynomial and transcendental equations-bisection method, Newton-Raphson method and Regula-falsi method

Engineering Mechanics

Fundamental principles of mechanics: Idealization of mechanics, Laws of mechanics, Force vector in 2D & 3D, Directions cosines, Dot and vector product, Moment of a force, Component of moment an axis, Couple & Couple moment, Force system, Reduction of complex force system to simplest form, Equivalent force system, Wrench.

Equilibrium: Definition, Conditions & Criteria of equilibrium, Free body diagram, 2 D & 3D problems on engineering applications. Plane Truss: Simple truss, Idealization of plane truss, Methods of sections & Joints.

Friction: Coulomb's law of dry friction, Roller, wedge & belt friction, Screw jack.

Kinematics and kinetics of a particle: Types of motion, Rectilinear & curvilinear translation, Relative velocity and relative acceleration, Dependent motion, kinematics w.r.t. a moving frame of reference, Kinematics in normal & tangential component & polar coordinates, Kinetics of particle, D'Alembert's principle, Principle of work & energy, Principle of Impulse & momentum, Collision of two bodies, Central & oblique impact.

Kinematics and Kinetics of rigid body: Kinematics of rotation, Non-Centroidal rotation Plane motion, Instantaneous centre of rotation, D'Alembert's principle, Principle of work & energy & principle of impulse-momentum of rigid body.

Axial force, shear and bending moment: Concept of Internal forces, Relation between axial force, shear force and bending, Shear force and bending moment diagram, Summation method and Singularity function.

English for Communication

Art of communication: Basic grammatical concept, Elementary theories of phonetics, sound of English, Mechanics of sound production, Rules of phonetics with examples, reading, listening and advanced writing skills. Business Letters, effective speaking (interactive sessions).Essay, poems and stories; The world is too with us: William words worth, the scientific point of view: JBS Haldane, Strange Meeting: Wilfred Owen, If: Rudyard Kipling, The Necklace: G D Maupassant, Piano: D H Lawrence Basic concepts in Communications: Nature of communication, Types of communication, Process of communication, Barriers to communication, Characteristics of successful communication, Informal communication: Chat, the grapevine, Rumour. Merits and limitations

Computer Programming

Digital computer fundamentals: Historical perspective, Early computers, the von Neumann architecture. Pseudo code, and Flowchart. Memory, Variables, Values, Instructions, Programs, Assembly language, High level language, Compiler, Assembler, Operating Systems, Binary and other number system representations and conversion between them. The C language Phases of developing a running computer program in C.

Data Concepts in C: Constants, Variables, Expressions, Operators, and operator precedence in C. Managing input and output statements, Sequential control statements, Decision making statements (If-Else constructs), Loop control statements (While construct, Do While construct, For construct).

Different basic data types and their sizes, One-dimensional Arrays: Declaration and Initialization, Two-dimensional Arrays: Declaration and initialization, Multidimensional Arrays.

String variables, Reading and writing strings, Arithmetic operations on characters, Putting strings together, Comparison of two strings

Functions: The prototype declaration, Function definition.

Function call: Passing arguments to a function (by value, by reference), Scope of variables.

Recursive function calls, Tail recursion, Tree of recursion.

Sorting problems: Selection sort, Insertion sort, Sorting in multidimensional arrays. Sorting in arrays

Search problems: Linear search and binary search. Recursive and iterative formulations

Pointers: Declaring and dereferencing pointer variables, Pointer arithmetic. Accessing arrays through pointers, Pointer types, Pointer and strings.

Structures in C: Motivation, examples, declaration, and use. Operations on structures, Passing structures as function arguments, Type defining structures.Self-referential structures, Dynamic data structures, Linked lists with examples

File operations in C: Input, output, and error streams. Opening, closing, and reading from files. Searching through files using functions such as fseek (), ftell (), and rewind (). Programming for command line arguments