

Important

Academic Rules

Scheme of

Studies & Syllabus



Diploma in Engineering Programme
1st Year (Common to all Branches)
(Effective from 2011-12)



LINGAYA'S
UNIVERSITY
choose to know

(u/s 3 of UGC Act 1956)

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ABBREVIATIONS/DEFINITIONS

- "AC" means, Academic Council of the University.
- "BOM" means, the Board of Management of the University.
- "BOS" means, the Board of Studies of the Department.
- "CAU/AUC-option" CAU/AUC means change from Credit to Audit option / change from Audit to Credit option
- "Class/Course Committee" means, the Class/Course Committee of a class/course.
- "Course" means, a specific subject usually identified by its course-number and course-title, with a specified syllabus / course-description, a set of references, taught by some teacher(s) / course-instructor(s) to a specific class (group of students) during a specific academic-semester.
- "Course Instructor" means, the teacher or the Course Instructor of a Course.
- "Curriculum" means the set of Course-Structure and Course-Contents.
- "DAA" means, the Dean of Academic Affairs.
- "DAAB" means Departmental Academic Appeals Board.
- "DEC/PEC" means Dissertation Evaluation Committee / Project Evaluation committee.
- "Department" means a group in the University devoted to a specific discipline also called a School. Department and School are used interchangeably.
- "DSA" means, Dean Student Affairs.
- "ESE" means End-Semester Examination
- "Faculty Advisor/Class Counsellor" means, the Faculty Advisor or the Panel of Faculty Advisors, in a Parent Department, for a group (admission-batch) of students. Also known as Class Counsellor.
- "Grade Card" means the detailed performance record in a programme.
- "He" means both genders "he" and "she"; similarly "his" and/or "him" includes "her" as well, in all the cases.
- "HOD" means, the Head of the Department.
- "MES" means Make-up End Semester.
- "MLC" means Mandatory Learning Course.
- "MSE" means Mid Semester Examination.
- "Parent Department" or "Degree Awarding Department" means, the department that offers the degree programme that a student undergoes.
- "Project Guide" means, the faculty who guides the Major Project of the student.
- "Regulations" means, set of Academic Regulations.
- "University" or "LU" means, Lingaya's University, Faridabad
- "VC" means, the Vice Chancellor, Lingaya's University, Faridabad.

CODE OF CONDUCT AND ETHICS FOR STUDENTS

1. Wear decent dress respecting his/her modesty as well as that of others.
2. Expected to respect and show regard for teachers, staff and fellow students.
3. Inculcate civic sense and sensitivity for environment protection.
4. Not to resort to collection of funds for any use without written permission of VC.
5. To exhibit exemplary behaviour, discipline, diligences, and good conduct and are a role model to other students.
6. Not to indulge in offences of cognizable nature.
7. Not to practice casteism, communalism.
8. Not to indulge in any other conduct unbecoming of a professional student of the University.
9. Not to outrage the status, dignity and honour of any person.
10. Not to get involved in physical assault or threat, and use of physical force against any body.
11. Not to expose fellow students to ridicule and contempt that may affect their self esteem.
12. Not to form any kind of student's Union, etc.
13. Not to take active or passive part in any form of strikes/protests.
14. To observe all safety precautions while working.
15. Not to disfigure/damage the University property, building, furniture, machinery, library books, fixtures, fittings, etc. (Damage / loss caused shall have to be made good by the students).
16. Use of mobile/video camera phones is strictly prohibited inside the examination halls, class rooms, laboratories and other working places. LU has the right to confiscate the mobile phones in case of any violation.
17. Not to indulge in ragging/teasing, smoking, gambling, use of drugs or intoxicants, drinking alcohol, rude behavior, and use of abusive language.
18. Not to resort to violence, unruly travel in buses, bullying, threatening and coercing others for undesirable act, such as preventing from attending classes, writing exam. / tests, etc etc.
19. All the students of the LU shall be under the disciplinary control of the VC.
20. Students are deemed to be under the care and guidance of parents. It is obligatory for the former to appraise their progress (given by the CC) to the parents.
21. Fine, if ever imposed, is only to improve discipline and shall be paid promptly.
22. While on campus, students have to take care of their belongings and no responsibility for any loss or damage can be held by the University.
23. Every student shall produce the I-Card on demand, and if lost, get a duplicate issued.
24. The students must attend all lectures, tutorials and practical classes in a course punctually (The attendance will be counted course-wise).
25. To abide by the rules and regulations of the University stipulated from time to time.

IMPORTANT ACADEMIC RULES

Diploma in Engineering Programme

GENERAL

- The Regulations may evolve and get revised/refined or updated or amended or modified or changed through approvals from the Academic Council from time to time, and shall be binding on all parties concerned, including the Students, Faculty, Staff, Departments, University Authorities and officers. Further, any legal disputes shall be limited to the legal jurisdiction determined by the location of the University and not that of any other parties.
- If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation etc., the matter will be reported to the AC, recommending revoking the admission of the candidate.
- The University reserves the right to cancel the admission of any student at any stage of his study programme in the University on the grounds of unsatisfactory academic performance or indiscipline or any misconduct.
- Medium of Instruction shall be English.

PROGRAMME

- The normal duration of the programme leading to Diploma in Engineering will be three years comprising six semesters.
- The total course package for a Regular Diploma in Engineering Programme with Project Mode will typically consist of the following components:
 - (i) General courses
 - (ii) Basic Science and Mathematics
 - (iii) Engineering Science and Technical Arts
 - (iv) Core Courses
 - (v) Elective Courses
 - (vi) Minor Project (Supervised)
 - (vii) Major Project (Supervised)
 - (viii) Industrial Training
 - (ix) Mandatory Learning Courses
- The minimum credit requirement for the Diploma in Engineering programme is 140.
- The minor project will be assigned in Semester-V. It may be extended to Major Project which is slated for Semester-VI. Appropriate double-letter grade is awarded as per the evaluation scheme which will be considered for SGPA and CGPA calculations. It is recommended that an external expert from industry/academia may be a member of the evaluation team of four persons (two professors, external expert and respective project guide).
- MLC must be completed by a student at appropriate time or at his convenience. The 'S' grade is awarded for satisfactory completion of the

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course and 'N' grade is awarded for non-satisfactory completion of the course. In case 'N' grade is awarded, the student has to re-register for the same course if no alternative options are available. However, one can opt for other courses if provided with multiple options. The 'S' and 'N' grades do not carry grade-points and, hence, are not included in the SGPA and CGPA computations.

Course(s) that come under this category is Professional Development Courses

ASSOCIATION

- Every Diploma in Engineering student of the University shall be associated with Parent Department (diploma/degree awarding department) offering the Diploma in Engineering programme that the student undergoes throughout his study period, right from the very first day of admission into the programme. However, in the first year class he may report to the OSD (F) for administrative/ academic purpose.
- A student will be placed in GROUP-A/B/C for all the six semesters in an academic year.
- The schedule of academic activities for a Semester, including the dates of registration, mid-semester examinations (MSE), end-semester examination (ESE), inter-semester vacation, etc. shall be referred to as the Academic Calendar of the semester, and announced at least two weeks before the closing date of the previous semester.

PRE-REGISTRATION

- In order to facilitate proper planning of the academic activities of a semester, it is essential for the students to declare their intent to register for a course well in advance, before the actual start of the academic session, through the process of Pre-Registration, which is mandatory for all those students of second or subsequent semester who propose to deviate from recommended scheme of studies.
- Pre-registration is an expression of intention of a student to pursue particular course(s) in the next semester. It is information for planning for next semester. Every effort will be made to arrange for a course opted by the student. However, it is not obligatory on the part of the university to offer the course(s) and no course may be offered if the number of students opting for the course is less than 15 or 25 percent of the admission strength whichever is less.
- If a student fails to pre-register it will be presumed that he will follow suggested normal scheme of studies provided that he is progressing at a normal pace. For remaining students the HOD of the parent department will plan for courses as per the convenience of the department.

REGISTRATION TO COURSES

- Every Student after consulting his Faculty-Advisor is required to register for

the approved courses with the HOD of parent department at the commencement of each semester on the days fixed for such registration as notified in the academic calendar.

- A student shall register for courses from amongst the courses being offered in the semester keeping in mind the minimum and maximum credits allowed for a degree and other requirements i.e. pre-requisite if any, SGPA and CGPA after consulting the Faculty Advisor. No registration will be valid without the consent of HOD of the parent department.
- A student will be permitted to register in the next semester as per the suggested normal scheme only if he fulfills the following Conditions:
 - (a) Satisfied all the Academic Requirements to continue with the programme of studies without termination.
 - (b) Cleared all university, library and hostel dues and fines (if any) of the previous semester.
 - (c) Paid all required advance payments of the university and hostel for the current semester.
 - (d) Not been debarred from registering on any specific ground by the University.
- The students will be permitted to register for course(s) being offered in a semester other than his normal suggested scheme provided that the time table permits.
- The registration in the critical cases will be done as per the priority given below:
 - (a) Fulfillment of minimum credit requirement for continuation,
 - (b) The completion of programme in minimum period needed for degree, (Those who need to improve SGPA/CGPA)
 - (c) The fulfillment of pre-requisite requirement of courses.
- Students who do not register on the day announced for the purpose may be permitted LATE REGISTRATION up to the notified day in academic calendar on payment of late fee.
- REGISTRATION IN ABSENTIA will be allowed only in exceptional cases with the approval of the DAA after the recommendation of HOD through the guardian of the student.
- Credits will be awarded in registered courses only.

CREDIT LIMITS

- A student of the B.Tech. degree programme must register for a minimum of 14 credits, and up to a maximum of 27 credits in a semester. However, the minimum / maximum credit limit can be relaxed by the DAA on the recommendation of the HOD, only under exceptional circumstances. The maximum credits that a student can register in a Summer Term are 10.
- Professional Development courses are one credit courses each, with multiple options, to be completed at student's convenience. Some of them may be mandatory and others two-letter grade category. However, registration has to be done for all courses.

CHANGE IN REGISTRATION

- A student has the option to ADD courses for registration till the date specified for late registration in the Academic Calendar.
- On recommendation of the Teaching Department as well as the Parent Department, a student has the option to DROP courses from registration until two weeks after the commencement of the classes in the semester, as indicated in the Academic Calendar.
- A student can register for auditing a course, or a course can be converted from credit to audit or from audit to credit, with the consent of the Faculty Advisor and Course Instructor within two weeks after the commencement of the classes in the semester as indicated in the Academic Calendar. However, CORE Courses shall not be available for audit.

ATTENDANCE REQUIREMENTS

- LU academic programmes are based primarily on the formal teaching-learning process. Attendance in classes, participating in classroom discussions and participating in the continuous evaluation process are the most essential requirements of any academic programme.
- Attendance will be counted for each course scheduled teaching days as per the academic calendar.
- The attendance requirement for appearing in end-semester examination shall be a minimum of 75% of the classes scheduled in each course.

LEAVE OF ABSENCE

- The leave of absence must be authorized as per regulations.
- A student short of attendance in a course (less than needed after leave of absence and condonation by VC) will be awarded 'FF' grade in the course.
- All students must attend all lecture, tutorial and practical classes in a course. The attendance will be counted course wise.
- To account for approved leave of absence e.g. representing the University in sports, games or athletics; professional society activities, placement activities, NCC/NSS activities, etc. and/or any other such contingencies like medical emergencies, etc., the attendance requirement shall be a minimum of 75% of the classes scheduled in each course to appear in the examination.
- A student with less attendance in a course during a semester, in lectures, tutorials and practicals taken together as applicable, shall be awarded 'FF' grade in that course, irrespective of his academic performance, and irrespective of the nature of absence.
- If the period of leave is more than three days and less than two weeks, prior application for leave shall have to be submitted to the HOD concerned, with the recommendation of the Faculty-Advisor, stating fully the reasons for the leave requested, along with supporting documents.
- If the period of leave is two weeks or more, prior application for leave shall

have to be made to the DAA with the recommendations of the Faculty-Advisor, HOD concerned stating fully the reasons for the leave requested, along with the supporting documents. The DAA may, on receipt of such application, grant leave or decide whether the student be asked to withdraw from the course for that particular semester because of long absence.

- If a student fails to apply and get sanction for absence as in (a) and (b) above, his parent/guardian may apply to the VC with reasons duly recommended by the faculty advisor, HOD and DAA and explain in person to the VC the reasons for not applying in time. The VC will consider on merit and decide to grant the leave or withdrawal from the course for that particular semester subject to any condition that he may like to impose. The decision of the VC shall be final and binding.

ABSENCE DURING EXAMINATIONS

- A student who has been absent during MSE due to illness and/or any exigencies may give a request for make-up examination within one week after the MSE to the HOD with necessary supporting documents in person. The HOD may consider such requests depending on the merits of the case, and after consultation with the Course Instructor, may permit the Make-up examination for the student concerned. However, no makeup examination will be permitted if the attendance in the course is less than 60% till the date of examination.
- In case of absence from End-Semester Examination of a course(s) on Medical ground and/or other special circumstances, the student can apply for award of 'I' grade in the course(s) with necessary supporting documents and certifications by an authorized person to the HOD within one week after the End-Semester Examination. The HOD may consider the request, depending on the merit of the case, and after consultation with the Course(s) Instructor(s)/ faculty advisor may forward the case to DAA with his recommendation for the award of 'I' grade. After permission by DAA in writing, the 'I' Grade is converted into a regular double letter grade on the basis of the students' marks in Mid-Semester Test and Class Work. However, if a student has scored 50% or more marks in Mid-Semester Test plus Class work his/her marks will be increased by 50% before awarding the grade. This applies to both theory and practical courses.

COURSE CREDIT ASSIGNMENT

- Every Course comprises of specific Lecture-Tutorial-Practical (L-T-P) Schedule. The credits for various courses are shown in the Schemes of Studies & syllabus.
- The Academic Performance Evaluation of a Student shall be according to a Letter Grading System, based on the Class Performance Distribution.
- The double-letter grade (AA, AB, BB, BC, CC, CD, DD, EE, FF) indicates the level of academic achievement, assessed on a decimal (0-10) scale.

Letters-Grade and Grade-Points

LETTER-GRADE	GRADE-POINTS	REMARKS
AA	10	
AB	9	
BB	8	
BC	7	
CC	6	
CD	5	
DD	4	
EE	2	
FF	0	Fail
I	-	Incomplete
U	-	Audited
W	-	Withdrawal
S	-	Satisfactory
N	-	Unsatisfactory

EARNED CREDITS

- This refers to the credits assigned to the programme in which a student has obtained either 'S' grade or any one of the double-letter grades 'AA', 'AB', 'BB', 'BC', 'CC', 'CD', 'DD' (but not 'EE' or 'FF'). While "0" credits will be earned in respect of a course, where obtained grade is 'FF'; it will be half the credits assigned to the course, in which obtained grade is 'EE'.

DESCRIPTION OF GRADES

- An 'AA' grade stands for outstanding performance, relative to the class which may include performance with previous batches. The Course Instructor is supposed to take utmost care in awarding of this highest double-letter grade.
- The 'DD' grade stands for marginal performance, pass in individual course but not adequate for SGPA / CGPA requirement.
- An 'EE' grade indicates that the student has attended the course but obtained less than pass marks. In this case he will earn half the credits assigned to the course.
- The 'FF' grade denotes very poor performance, i.e. failure in a course, and the Course Coordinator/Instructor is supposed to take utmost care while awarding this lowest double-letter grade.
- A student, who obtains 'FF' grade in a core course due to detention in attendance, has to repeat (re-register) course in subsequent semesters/sessions whenever the course is offered. In other cases of 'FF' Grade, a student has three options as follows:
 - a) Repeat the course,
Or
 - b) Only appear in End-Semester Examination in a subsequent semester and evaluated out of 70 marks for new grade computation.
The new grade will be computed out of 100 marks as follows:
ETE = 70 (against 50 marks for the regular students)

CW = 30, to be brought forward from the earlier Semester.

Or

- c) Get the course converted into a partially dropped course to earn two grade points but earn only half the credits meant for that course. It could be termed as two letter grade 'EE'.
- There are four possible ways of clearing backlog courses and improvement of grades: Subsequent Semester; Summer Term; Week Ends; after University hours with the following overriding conditions – (i) There will be minimum 60% of contact hours of a regular course in a semester for doing backlog in any mode, (ii) The attendance requirement shall be a minimum of 75% of the classes scheduled in each course without any condonation.
 - An 'I' grade denotes incomplete performance in any course due to absence at the End-Semester Examination (see Section "Absence during Examination").
 - 'U' grade is awarded in a course that the student opts to register for audit. It is not mandatory for the student to go through the entire regular process of evaluation in an audit course. However, the student has to go through some process of minimal level of evaluation and also the minimum attendance requirement, as stipulated by the Course Instructor and approved by the corresponding BOS, for getting the 'U' grade awarded in a course, failing which that course will not be listed in the Grade Card.
 - A 'W' grade is awarded when the student withdraws from the course. Withdrawal from a course is permitted only under extremely exceptional circumstances (like medical emergencies, family tragedies and/or other unavoidable contingencies) and has to be recommended by the HOD and approved by the DAA. However, no withdrawal is permitted after the finalization of the grades in the semester.
 - 'S'/N' These grades are awarded for the Mandatory Learning Courses. The 'S' grade denotes satisfactory performance and completion of a course. The 'N' grade is awarded for non-completion of course requirements and the student will have to register for the course until he obtains the 'S' grade.

FEEDBACK TO STUDENTS

- A student requires feedback on the progress of his learning. For this purpose, the Instructor will conduct at least two quizzes for a theory course in a semester-one before MSE and the other there after. The quizzes will form a component of class work, the other components being tutorials, home assignments or any other mode.
- For a laboratory course, the continuous assessment's feed back will be given through the laboratory records which are required to be submitted after performing the experiment in the next laboratory class.
- The continuous feedback on project/major project will be through project diary and interim report.
- For Internship stream, the continuous assessment and feedback is to be through seminars, professional dairy and interim reports at the place of work.

EVALUATION

Theory Course:

- The double-letter grade awarded to a student in a course other than a practical course i.e. 0-0-P course for which he has registered, shall be based on his performance in quizzes, tutorials, assignments etc., as applicable, in addition to one Mid-Semester Examination and end-semester examination. The weightage of these components of continuous evaluation may be as follows:

End-Semester Examination	: 50%
Mid-Semester Examinations (2x10%)	: 20%
Class Work [Elements of evaluation: Quizzes, Tutorials, Assignments, etc. (Several over the Semester) + Attendance (10 %)]	: 30%
Total	: 100%

Any variation, other than the above distribution, requires the approval of the pertinent BOS.

Laboratory Course

- The double letter grade awarded to the student in a practical course i.e. 0-0-P course is to be based on his performance in regular conduct of experiments, viva voce, laboratory report, quizzes etc. The weightage of the components of continuous evaluation may be as follows:

Conduct of Experiments (as per syllabus)	: 50%
Lab Record	: 20%
Quizzes/Viva Voice	: 30%
Total	: 100%

Each experiment may be considered as a unit and evaluated to assess formative and cumulative performance say each of the experiments which carries 10 marks with distribution 5+2+3. Finally, the teacher looks at attendance and total earned marks in the experiments done in a Semester and awards the grades relatively.

Any variation, other than the above distribution, requires the approval of the pertinent BOS.

Minor Project:

- The double letter grade awarded to the student in Project (Includes Seminar) i.e. 0-0-P course will be based on his performance in technical work pertaining to the solution of a small size problem, project report, and presentation of work and defending it in a viva-voce. The weightage of the components of continuous evaluation may be as follows:

Technical Work	:	50%
Report	:	25%
Seminar, Presentation & Viva-voce	:	25%
Total	:	100%

Major Project:

- The double letter grade awarded to the student in Major Project Phase-I and Phase-II i.e. 0-0-P course will be based on his performance in technical work pertaining to the solution of a problem, project report, presentation and defending in a viva-voce. The weightage of the components of continuous evaluation may be as follows:

Technical Work	:	50%
Report	:	25%
Presentation & Viva-voce	:	25%
Total	:	100%

Industrial/Field Training/Survey Camp :

- The double letter grade awarded to the student in Industrial/Field Training/Internship-I i.e. 0-0-P course will be based on Practical Training/Internship-I in an industry, professional organization/ research laboratory. The components of continuous evaluation with weightage may be as follows:

Training report	:	40%
Presentation	:	30%
Questions and answers	:	30%
Total	:	100%

Professional Development:

- The evaluation process of these courses will be as per the nature, contents and delivery of these courses. Some of the common components of evaluation could be quizzes, viva-voce, practical test, group discussion, etc. Participation by students is to be given more weightage in Co-curricular courses.
- The University shall conduct the End-Semester examination for all theory courses being taught in the Semester.

SCHEME OF EXAMINATION

- The duration of examinations for a theory course will be 3 hours for end-semester examination 1½ hours for mid-semester examination.
- The pattern of question paper/examination will be as under:

Theory Courses:

- The University shall conduct the ESE for all theory courses being taught in the semester.
- i) There will be eight questions in all distributed over all the units in a course syllabus. The question paper will be in two parts with weightage 20 percent and 80 percent respectively. The paper setter must set the questions such that each question can be answered in about 35 minutes and the paper can be solved in 3 hours by an average student.
 - ii) Part-A will have one question of objective types with multiple choices, covering all the units in the syllabus, which will be compulsory.

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- iii) Part-B will consist of seven questions, one question from each of the seven units, and the students are required to solve any four. Out of seven any three questions will have long answers of comprehensive/ derivation/description type and the remaining four questions will be of problem solving type in order to measure ability on analysis/ synthesis/application.

If any special instruction(s) is/are required for a particular course, it/they is/are to be specified by the concerned HOD with prior approval of DAA.

- Students are allowed in the examination the use of single memory, non-programmable calculator. However, sharing of calculator is not permitted.
- **Mid-Semester Examination:**
There is one compulsory question covering all topics taught till then. Further, there will be four questions, two of which will be essay type and the other two to measure ability on analysis/ synthesis/ application. The student will answer any two out of the four.

TRANSPARENCY

- The answer books of all MSE and ESE will be shown to the students within three days of the last paper. It is the responsibility of the student to check this evaluation and affix his signature in confirmation.
- If the student finds some discrepancy, he should bring it to the notice of the Course Coordinator. The Course Coordinator will look into the complaint and remove the doubts of the student and proceed with the work of grading.
- The entire process of evaluation shall be transparent, and the course instructor shall explain to a student the marks he is awarded in various components of evaluation.

RESULT

- The final marks and grades shall be displayed on the notice board and a student can approach the Course Instructor(s) concerned for any clarification within the period stipulated in the Academic Calendar. The process of evaluation shall be transparent and the students shall be made aware of all the factors included in the evaluation. In case of any correction, the Course Instructor shall have to incorporate the same before finalization of the grades.
- The Student's Grade Card shall contain the Letter-Grade for each registered course; along with the SGPA at the end of the semester, and the CGPA at the completion of the programme.

APPEAL FOR REVIEW OF GRADE

- If a student is not satisfied with the award of the grade after the announcement of the grades, he may appeal on a Grievance Form duly filled in along with the fee receipt for this purpose to the HOD of the parent department within one week of the following semester. The HOD will forward the form along with his recommendation based on the records of the case to DAAB within the date specified in the Academic Calendar.
- The fee for such an appeal will be decided from time to time. If the appeal is

upheld by DAAB, then the fee amount will be refunded to the student without interest.

- VC shall have power to quash the result of a candidate after it has been declared, if
 - (a) He is disqualified for using malpractice in the examination;
 - (b) A mistake is found in his result;
 - (c) He is found ineligible to appear in the examination

AWARD OF DIVISIONS

- The overall performance of a student will be indicated by two indices:
 - (i) **SGPA** which is the Semester Grade Point Average
 - (ii) **CGPA** which is the Cumulative Grade Point Average

SGPA for a Semester is computed as follows:

$$SGPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where,

C_i denotes credits assigned to i^{th} course with double-letter grade, and G_i denotes the grade point equivalent to the letter grade obtained by the student in i^{th} course with double-letter grade, including all 'FF' grades in that semester.

CGPA is computed as follows:

$$CGPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where,

C_i denotes credits assigned to i^{th} course with double-letter grade, and G_i denotes the grade point equivalent to the letter grade obtained by the student in i^{th} course for all courses with double-letter grades, including all 'FF' grades in all semesters at the end of the programme.

For CGPA calculation, the following grades are to be counted:

- (i) Grades in all core courses,
 - (ii) The best grades in the remaining eligible courses to fulfill the minimum credits requirement for a programme.
- The degree will be awarded only upon compliance of all the laid down requirements for programme as under:
 - (i) There shall be University requirement of earning a minimum credits for a degree, satisfactory completion of mandatory learning courses and other activities as per the course structure.
 - (ii) There shall be a minimum earned credit requirement on all Departmental Core Courses, Elective courses and Major Project as specified by BOS.
 - (iii) There shall be a maximum duration for complying to the degree requirement.
 - (iv) The candidate will be placed in First Division with Honours/First Division with Distinction/First Division/Second Division which will be mentioned on the degree certificate as under:

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DIVISION	CONDITIONS TO BE FULFILLED
First Division with Distinction	CGPA \geq 8.5
First Division	CGPA \geq 6.75
Second Division	CGPA \geq 5.0 but $<$ 6.75

Note: Although, there is no direct conversion from grades to marks, however, for comparison purposes percentage of marks may be assumed to be CGPA multiplied by nine.

DIPLOMA IN ENGINEERING REQUIREMENTS

- The requirements of the award of Diploma in Engineering programme are as follows:
 - University Requirements:**
 - Minimum Earned Credit Requirement for diploma is 140 for regular programme.
 - Satisfactory completion of all Mandatory Learning Courses.
 - Programme Requirements:** Minimum Earned Credit Requirements on all Core Courses, Elective Courses and Major Project as specified by the BOS.
 - The CGPA at the end of programme is atleast 5.0.
 - The Maximum duration for a student for complying with the Degree Requirement is SIX years from date of first registration for first Semester.

GRADE IMPROVEMENT

- A student may be allowed to improve the SGPA in an appropriate Semester, if his SGPA falls below 5.0. Similarly, any student may be allowed to improve performance in any course provided the course is being floated and available.

TERMINATION FROM THE PROGRAMME

- A student shall be required to leave the University without the award of the Degree, under one or more of the following circumstances:
 - If a student fails to earn the minimum credits specified below:

CHECK POINT	PERCENTAGE OF CREDITS** (%)
End of FIRST year	70*
End of SECOND year	75*
End of THIRD year	80

Note 1:

* A student may be given one more chance to cover the shortfall in the threshold at the end of first two years during the following summer semesters if s/he can fulfill the requirement by doing two courses. In case s/he fails to clear the threshold even after the summer semester he has to leave the course.

** If at any stage, a student fails to cross the threshold with a minimum of 5.0 SGPA in any semester, he will be treated as

critical case and will be advised to improve the grades.

Note 2: The period of temporary withdrawal (refer: Clause No. G8.1) is not to be counted for the above Credit Threshold.

- (b) If a student is absent for more than 4 (Four) weeks at a stretch in a Semester without sanctioned leave.
- (c) Based on disciplinary action by the AC, on the recommendation of the appropriate committee.

Note: Under any circumstances of termination, the conditions specified in Permanent. Withdrawal (refer: Clause No: G8.2) shall also apply.

WITHDRAWAL FROM PROGRAMME

Temporarily:

- A student who has been admitted to a degree programme of the University may be permitted to withdraw temporarily, for a period of one semester or more, on the grounds of prolonged illness or grave calamity in the family, etc., provided:
 - (i) He applies to the University stating fully the reasons for withdrawal together with supporting documents and endorsement from his parent/guardian
 - (ii) There are no outstanding dues or demands, from the Departments/ University / Hostels/Library and any other centers;
 - (iii) Scholarship holders are bound by the appropriate Rules applicable to them.
 - (iv) The decision of the VC of the University regarding withdrawal of a student is final and binding.
- Normally, a student will be permitted only one such temporary withdrawal during his tenure as a student and this withdrawal will not be counted for computing the duration of study.

Permanently:

- Any student who withdraws permanently admission before the closing date of admission for the academic session is eligible for the refund of fee as per the University rules. Once the admission for the year is closed, the following conditions govern withdrawal of admission:
- A student who wants to leave the University for good, will be permitted to do so (and take Transfer Certificate from the University, if needed), only after clearing all the dues for the remaining duration of the course.
- A student who has received any scholarship, stipend or other form of assistance from the University shall repay all such amounts, in addition, to clearing all the dues for the remaining duration of the course.
- The decision of the VC regarding all aspects of withdrawal of a student shall be final and binding.

Diploma in Engineering Programme

OBJECTIVE

The aim of the diploma course is to supply quality technician manpower which is application and industry oriented. The study scheme consist of curricular component comprising courses in general studies, applied sciences, basic engineering/technology, applied engineering/technology and specialized areas (electives).

Along with the advancement in technology newer teaching learning methods have emerged where in the curriculum aims at the total development of the students in addition to imparting technical skills in the chosen area of work.

Currently the university is offering diploma courses in the following disciplines:

1. Civil Engineering
2. Computer Engineering
3. Electronics Engineering
4. Electrical Engineering
5. Mechanical Engineering

But in due course more will be added determined by the needs of a fast developing economy like India's.

Scheme of Studies
Diploma in Engineering Programme
(Common to all Branches)

1st Year
Semester-I

THEORY							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	Class Work	MSE (1½ Hrs)	ESE (3 Hrs)	Total	
EN-101-D	Communication Skills-I	3-0-0	30	10+10	50	100	3
MA-101-D	Applied Mathematics-I	3-1-0	30	10+10	50	100	4
PH-101-D	Applied Physics -1	3-0-0	30	10+10	50	100	3
CH-101-D	Applied Chemistry-I	2-0-0	30	10+10	50	100	2

PRACTICAL / DRAWING / DESIGN							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	EXPT.	Lab Record	Quizzes/ Viva-voce	Total	
EN-151-D	Communication Skills-I Lab	0-0-2	50	20	30	100	1
PH-151-D	Applied Physics -1 Lab	0-0-2	50	20	30	100	1
CH-151-D	Applied Chemistry-I Lab	0-0-2	50	20	30	100	1
IT-151-D	Basics of Information Technology Lab	0-1-2	50	20	30	100	2
ME-151-D	Engineering Drawing-I	0-1-4	50	20	30	100	3
ME-152-D	General Workshop Practice-I	0-1-4	50	20	30	100	3
PD-191-D	Co-curricular Activities						1*

TOTAL CONTACT HOURS	TOTAL CREDITS
11-4-16 (31)	23

FINAL EVALUATION IN GRADES

(L-T-P-Cr) - Lectures-Tutorials-Practical-Credits

MSE – Mid-Semester Examination

ESE – End-Semester Examination

* One credit to be earned in Semester-II through Co-Curricular Activities outside contact hours. However, a student is to register for this course in all the two Semesters of first year.

Scheme of Studies
Diploma in Engineering Programme
(Common to Civil Engg. & Mechanical Engg.)

1st Year
Semester-II

THEORY								
Course No.	Course Name	Periods	Evaluation Scheme				Cr	
		L-T-P	Class Work	MSE (1½ Hrs)	ESE (3 Hrs)	Total		
EN-102-D	Communication Skills –II	2-0-0	30	10+10	50	100	2	
MA-102-D	Applied Mathematics-II	3-1-0	30	10+10	50	100	4	
PH-102-D	Applied Physics – II	3-0-0	30	10+10	50	100	3	
CH-102-D	Applied Chemistry – II	2-0-0	30	10+10	50	100	2	
ME-103-D	Applied Mechanics	3-0-0	30	10+10	50	100	3	

PRACTICAL / DRAWING / DESIGN								
Course No.	Course Name	Periods	Evaluation Scheme				Cr	
		L-T-P	EXPT.	Lab Record	Quizzes/Viva-voce	Total		
EN-152-D	Communication Skills –II Lab	0-0-2	50	20	30	100	1	
PH-152-D	Applied Physics – II Lab	0-0-2	50	20	30	100	1	
CH-152-D	Applied Chemistry – II Lab	0-0-2	50	20	30	100	1	
ME-153-D	Applied Mechanics Lab	0-0-2	50	20	30	100	1	
ME-154-D	Engineering Drawing – II	0-1-4	50	20	30	100	3	
ME-155-D	General Workshop Practice-II	0-1-4	50	20	30	100	3	
PD-191-D	Co-curricular Activities						1*	

TOTAL CONTACT HOURS	TOTAL CREDITS
13-3-16 (32)	24+1*

FINAL EVALUATION IN GRADES

(L-T-P-Cr) - Lectures-Tutorials-Practical-Credits

MSE – Mid-Semester Examination

ESE – End-Semester Examination

- * One credit to be earned in Semester-II through Co-Curricular Activities outside contact hours. However, a student is to register for this course in all the two Semesters of first year.

Scheme of Studies
Diploma in Engineering Programme
Computer Engineering

1st Year
Semester-II

THEORY							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	Class Work	MSE (1½ Hrs)	ESE (3 Hrs)	Total	
EN-102-D	Communication Skills -II	2-0-0	30	10+10	50	100	2
MA-102-D	Applied Mathematics-II	3-1-0	30	10+10	50	100	4
PH-102-D	Applied Physics-II	3-0-0	30	10+10	50	100	3
CH-102-D	Applied Chemistry-II	2-0-0	30	10+10	50	100	2
EL-101-D	Basic Electrical Engineering	3-0-0	30	10+10	50	100	3
EC-101-D	Analog Electronics-I	2-0-0	30	10+10	50	100	2
CS-101-D	Programming in C	2-0-0	30	10+10	50	100	2

PRACTICAL / DRAWING / DESIGN							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	EXPT.	Lab Record	Quizzes/ Viva-voce	Total	
EN-152-D	Communication Skills –II Lab	0-0-2	50	20	30	100	1
PH-152-D	Applied Physics – II Lab	0-0-2	50	20	30	100	1
CH-152-D	Applied Chemistry – II Lab	0-0-2	50	20	30	100	1
EL-151-D	Basic Electrical Engineering Lab	0-0-2	50	20	30	100	1
EC-151-D	Analog Electronics-I Lab	0-0-2	50	20	30	100	1
CS-151-D	Programming in C Lab	0-0-2	50	20	30	100	1
PD-191-D	Co-curricular Activities						1*

TOTAL CONTACT HOURS	TOTAL CREDITS
17-1-12 (30)	24+1*

FINAL EVALUATION IN GRADES

(L-T-P-Cr) - Lectures-Tutorials-Practical-Credits

MSE – Mid-Semester Examination

ESE – End-Semester Examination

- * One credit to be earned in Semester-II through Co-Curricular Activities outside contact hours. However, a student is to register for this course in all the two Semesters of first year.

**Scheme of Studies
Diploma in Engineering Programme
Electronics Engineering**

1st Year
Semester-II

THEORY							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	Class Work	MSE (1½ Hrs)	ESE (3 Hrs)	Total	
EN-102-D	Communication Skills -II	2-0-0	30	10+10	50	100	2
MA-102-D	Applied Mathematics-II	3-1-0	30	10+10	50	100	4
PH-102-D	Applied Physics-II	3-0-0	30	10+10	50	100	3
CH-102-D	Applied Chemistry-II	2-0-0	30	10+10	50	100	2
EL-101-D	Basic Electrical Engineering	3-0-0	30	10+10	50	100	3
EC-101-D	Analog Electronics-I	2-0-0	30	10+10	50	100	2

PRACTICAL / DRAWING / DESIGN							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	EXPT.	Lab Record	Quizzes/ Viva-voce	Total	
EN-152-D	Communication Skills –II Lab	0-0-2	50	20	30	100	1
PH-152-D	Applied Physics – II Lab	0-0-2	50	20	30	100	1
CH-152-D	Applied Chemistry – II Lab	0-0-2	50	20	30	100	1
EL-151-D	Basic Electrical Engineering Lab	0-0-2	50	20	30	100	1
EC-151-D	Analog Electronics-I Lab	0-0-2	50	20	30	100	1
ME-155-D	General Workshop Practice-II	0-1-4	50	20	30	100	3
PD-191-D	Co-curricular Activities						1*

TOTAL CONTACT HOURS	TOTAL CREDITS
15-2-14 (31)	24+1*

FINAL EVALUATION IN GRADES

(L-T-P-Cr) - Lectures-Tutorials-Practical-Credits

MSE – Mid-Semester Examination

ESE – End-Semester Examination

- * One credit to be earned in Semester-II through Co-Curricular Activities outside contact hours. However, a student is to register for this course in all the two Semesters of first year.

Scheme of Studies
Diploma in Engineering Programme
Electrical Engineering

1st Year
Semester-II

THEORY							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	Class Work	MSE (1½ Hrs)	ESE (3 Hrs)	Total	
EN-102-D	Communication Skills -II	2-0-0	30	10+10	50	100	2
MA-102-D	Applied Mathematics-II	3-1-0	30	10+10	50	100	4
PH-102-D	Applied Physics-II	3-0-0	30	10+10	50	100	3
CH-102-D	Applied Chemistry-II	2-0-0	30	10+10	50	100	2
EL-101-D	Basic Electrical Engineering	3-0-0	30	10+10	50	100	3

PRACTICAL / DRAWING / DESIGN							
Course No.	Course Name	Periods	Evaluation Scheme				Cr
		L-T-P	EXPT.	Lab Record	Quizzes/ Viva-voce	Total	
EN-152-D	Communication Skills –II Lab	0-0-2	50	20	30	100	1
PH-152-D	Applied Physics – II Lab	0-0-2	50	20	30	100	1
CH-152-D	Applied Chemistry – II Lab	0-0-2	50	20	30	100	1
EL-151-D	Basic Electrical Engineering Lab	0-0-2	50	20	30	100	1
ME-154-D	Engineering Drawing – II	0-1-4	50	20	30	100	3
ME-155-D	General Workshop Practice-II	0-1-4	50	20	30	100	3
PD-191-D	Co-curricular Activities						1*

TOTAL CONTACT HOURS	TOTAL CREDITS
13-3-16 (32)	24+1*

FINAL EVALUATION IN GRADES

(L-T-P-Cr) - Lectures-Tutorials-Practical-Credits

MSE – Mid-Semester Examination

ESE – End-Semester Examination

- * One credit to be earned in Semester-II through Co-Curricular Activities outside contact hours. However, a student is to register for this course in all the two Semesters of first year.

IMPORTANT NOTES

1. Laboratory Courses are being offered as distinct courses (0-0-P) without being mixed with lecture components.
2. Conduct of Lab Courses:
 - a. At least ten experiments/programs are to be performed in a term.
 - b. It is expected that more experiments/programs are designed and set as per the scope of the syllabus, which may be added to the above list.
 - c. One or more than one experiments/programs may be performed in one lab period in order to utilize the time properly.
 - d. The scheme of operation is to be approved by HOD.
3. Students are allowed in the examination the use of single memory, non-programmable calculator. However, sharing of calculator is not permitted.

DETAILED SYLLABUS (CE, CS, EC, EL, ME)

EN-101-D	COMMUNICATION SKILLS – I	L-T-P	Cr
		3-0-0	3

OBJECTIVE

Language is the most commonly used and effective medium of self-expression in all spheres of human life - personal, social and professional. A student must have a fair knowledge of English language and be able to pursue the present course of study and handle the future jobs in industry. The objective of this course is to assist the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, develop grammatical ability, enhance writing skills, correspond with others and enhance skills in spoken English.

1. **PROSE TEXT BOOK:** The following six chapters of "A Book of English for Polytechnics - Prose Selection" published by MacMillan India Ltd., on behalf of Technical Teachers' Training Institute, Chandigarh: a) Adventure in Space, b) An Engineering Wizard, c) The Diamond Necklace, d) God lives in the Panch, e) The Man who found penicillin, f) Guru Nanak Dev.
2. **COMPREHENSION:** from the prescribed 6 chapters of Prose Text Book and simple unseen passages
3. **GRAMMAR:** Prepositions; correction; voice; narration; punctuation; tenses; correction of incorrect sentences.
4. **VOCABULARY:** Words, idioms, phrases, antonyms and synonyms; homophone and homonyms; Translation of 300 most commonly used scientific, technological semesters and sentences in Hindi to English and English to Hindi.
5. **BOOK/MOVIE REVIEW WRITING:** English to Hindi and Hindi to English
6. **PARAGRAPH WRITING:** Technology; Science; Economy; Political; Social; General
7. **CREATIVE WRITING:** Picture composition; composition based on real life or responses to incidents

TEXT BOOK

Pal and Roruaing, "Essentials of Business Communication", 3rd edition, Sultan Chand and Sons

REFERENCE BOOKS

1. Ludlow and Panthon, "The Essence of Effective Communication", Prentice Hall of India
2. Kohli, AL, "New Design English Grammar Reading and Writing Skills" (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh.

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3. Kohli, MK and Kohli , AL, "New Design English Reading and Advanced Writing Skills for Class XI and XII", Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
4. Sasikumar, V and Dhamija, PV, "Spoken English", Tata McGraw Hill
5. Taylor, Grount, "English Conversation Practice", Tata McGraw Hill
6. Mohan, Krishna and Banerji, Meera, "Developing Communication Skills"; MacMillan India Ltd., Delhi
7. Sharma, RC and Mohan, Krishna, "Business Correspondence and Report Writing" Tata McGraw Hill Publishing Company Ltd. New Delhi
8. Roy, R. Datta and Dhir, KK, "Communication Skills", Vishal Publication, Jalandhar
9. "Intermediate use of Grammar and Composition" by Orient Longman.

EN-151-D	COMMUNICATION SKILLS-I LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. How to locate reading material in the library?
2. How to look up words in a dictionary?
3. How to look up information from an encyclopedia?
4. Acquaintance with 44 sounds of pronunciation
5. Introducing self and others
6. Paper reading
7. Group Discussions
8. Seminar presentation on a given topic/theme
9. Declamation contest
10. Documentation of data collected

MA-101-D	APPLIED MATHEMATICS - I	L-T-P	Cr
		3-1-0	4

OBJECTIVE

Applied Mathematics forms the backbone of engineering discipline. Basic elements of permutations and combinations, trigonometry, vector, complex number and statistics have been included in the curriculum as foundation course and to provide base for continuing education to the students

1. **ALGEBRA:** Permutations and Combinations, Value of nPr and nCr , its properties and simple problems; Binomial theorem for positive integral index (expansion and general term); Binomial theorem for any index (expansion only) first and second binomial approximation with application to engineering problems
2. **PARTIAL FRACTIONS, DETERMINANTS AND MATRICES:** Partial fractions - linear factors, repeated linear factors, non reducible quadratic factors; Determinants and Matrices - expansion of determinants (upto third order) using sarrus rule, expansion method and pivotal's condensation method. Properties of

- determinants, solution of equations (upto 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction and multiplication of matrices (upto third order). Inverse of a matrix by adjoint method and elementary row transformations. Solution of equations (up to 3 unknowns) by Matrix method
3. **TRIGONOMETRY:** Addition and subtraction formulae, product formulae and their application in engineering problems. Transformation from product to sum or difference of two angles or vice versa, multiple and sub-multiple angles; Conditional identities, solution of triangles (excluding ambiguous cases); trigonometric equations.
 4. **LOGARITHM:** general properties of logarithms, calculations of engineering problems using log tables; Graphs of $\sin x$, $\cos x$, and $\tan x$, e^x
 5. **VECTORS ALGEBRA:** Definition of vector and scalar quantities. Addition and subtraction of vectors. Dot product and cross product of two vectors. Thumb rule. Angle between two vectors, application of dot and cross product in engineering problems, scalar triple product and vector triple product
 6. **COMPLEX NUMBERS:** Definition, Real and Imaginary parts of a complex number, Polar and Cartesian representation of a complex number and conversion from one form to the other, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number.
 7. **STATISTICS AND PROBABILITY:** Evaluation of standard deviation and process capabilities. Rank, Rank correlation, probability: definition and laws on probability, concept of random variable, probability distribution (Binomial, Poisson and Normal) and their applications. Drawing control charts for average (\bar{x}) and range (R)

TEXT BOOK

Gupta, D , "Engineering Mathematics" 5th edition, S.Chand, 2009

REFERENCE BOOKS

1. Sabharwal, SS , "Applied Mathematics Vol. I" Eagle Prakashan, Jalandhar, 2nd edition, 2010
2. Kohli, S, "Engineering Mathematics Vol. I", IPH, Jalandhar, 3rd edition, 2008.
3. Mathur, AB, Jagi, VP, "Advanced Engineering Mathematics" Khanna Publishers, Delhi, 8th edition, 2010.
4. Grewal, BS, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 13th edition, 2010.

PH-101-D	APPLIED PHYSICS – I	L-T-P	Cr
		3-0-0	3

OBJECTIVE

Applied physics includes the study of a large number of diverse topics all related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave.

Engineering Diploma Programme

Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

1. **UNITS AND DIMENSIONS:** Physical quantities; Fundamental and derived units; Systems of units (FPS, CGS, MKS and SI units); Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain); Principle of homogeneity; Dimensional equations and their applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration; Limitations of dimensional analysis.
2. **FORCE AND MOTION:** Scalar and vector quantities - examples, addition and multiplication (scalar product and vector product) of vectors; Force, resolution and composition of forces - resultant, parallelogram law of forces; Equilibrium of forces, Lami's theorem; Newton's Laws of motion - concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion; conservation of momentum, impulse and impulsive forces, simple numerical problems based on third law; Projectile, horizontal and oblique projections and equation of trajectory; Derivation of time of flight, maximum height and horizontal range; Circular motion; Relation between linear and angular velocity and linear acceleration and angular acceleration; Centripetal force (derivation) and centrifugal force; Banking of roads
3. **WORK, POWER AND ENERGY:** Work: definition and its SI units; Work done in moving an object on horizontal and inclined plane (incorporating frictional forces); Power: definition and its SI units, calculation of power in simple cases; Energy: Definition and its SI units: Types: Kinetic energy and Potential energy, with examples and their derivation; Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another
4. **PROPERTIES OF MATTER:** Elasticity, definition of stress and strain; Different types of modulus of elasticity; Explanation of stress - strain diagram; Pressure - its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure, manometers and barometer gauges; Surface tension - its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension; Fluid motion, stream line and turbulent flow, Reynolds number; Viscosity and coefficient of viscosity; derivation of terminal velocity; effect of temperature on viscosity;
5. **WAVES AND VIBRATIONS:** Generation of waves by vibrating particles; Wave motion with examples; Types of wave motion, transverse and longitudinal wave motion with examples; Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$); Sound and Light waves; Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.; Vibration of cantilever and beam, determination of time period of a cantilever; Free, forced and resonant vibrations with examples

- 6. ROTATIONAL MOTION, GRAVITATION AND SATELLITES:** Rotational Motion - Definitions of torque, moment of inertia, radius of gyration; Derivation of rotational kinetic energy and angular momentum; Conservation of angular momentum (qualitative); Theorems of parallel and perpendicular axes; Gravitation and satellites - Kepler's laws of planetary motion; Newton's law of gravitation; Escape velocity (derivation); Satellites, Geostationary satellite
- 7. TEMPERATURE & ITS MEASUREMENT AND TRANSFER OF HEAT:** Principles of measurement of temperature and different scales of temperature; Difference between heat and temperature on the basis of K.E. of molecules; Bimetallic and Platinum resistance thermometer: their merits and demerits; Pyrometers - Disappearing filament optical pyrometer; Transfer of Heat - Modes of transfer of heat (conduction, convection and radiation with examples); Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method) Properties of heat radiation; Stefan's law, Kirchhoff's law, Wien's law, Planck's black body radiation law; Prevost's theory of heat exchange

TEXT BOOK

Gomber and Gogia, "Fundamental Physics - Volume I and II", Pardeep Publications, Jalandhar, 7th edition 2010.

REFERENCE BOOKS

- Gaur, R.K, "Basic Applied Physics", Dhanpat Rai Publications, 5th edition, 2010.
- Jaiswal, JN, "Comprehensive Practical Physics - Volume I and II", Laxmi Publishers, 2nd edition, 2010.
- Resnick and Halliday, "Fundamentals of Physics", Asian Books Pvt. Ltd., New Delhi, 14th edition, 2009.
- Verma, H.C., "Concepts in Physics", Bharti Bhawan Ltd., New Delhi, 3rd edition, 2010.

PH-151-D	APPLIED PHYSICS-I LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

- To find the thickness of wire using a screw gauge
- To find volume of solid cylinder and hollow cylinder using a vernier caliper
- To determine the thickness of glass strip and radius of curvature of a curved surface using a spherometer
- To find the surface tension of a liquid by capillary rise method
- To determine and verify the time period of cantilever by drawing graph between load (w) and depression (D)
- To determine the atmospheric pressure at a place using Fortin's Barometer
- To determine the coefficient of linear expansion of a metal rod

Engineering Diploma Programme

8. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus
9. To find the coefficient of thermal conductivity of bakelite sheet (bad conductor) by Lee's Disc Method
10. To draw $L-T^2$ graph and find out acceleration due to gravity, using simple pendulum.

CH-101-D	APPLIED CHEMISTRY-I	L-T-P	Cr
		2-0-0	2

OBJECTIVE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

1. **LANGUAGE OF CHEMISTRY:** Definition of symbol, formula, valency and chemical equation; Writing of the chemical formula of a simple chemical compound; Calculation of percentage composition of a chemical compound; Essentials of a chemical equation, balancing of a chemical equation by Hit and Trial method
2. **CHEMICAL BONDING:** Electronic concept of valency; Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples to each
3. **WATER-I:** Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam Generation; Definition of degree of hardness of water and the systems to express the degree of hardness of water; Simple numerical problems related to finding the degree of hardness on different scales; Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply
4. **WATER-2 – TREATMENT OF WATER:** Coagulation; sedimentation; Disinfection; Clark's Process; Permutit Process; Soda Lime process; Ion-Exchange process; Simple numerical problems related to soda lime process. Electrodialysis method; reverse osmosis method.
5. **SOLUTIONS:** Concept of homogenous solution, brief introduction of the terms, Ionization, Acidity, Basicity, equivalent weight and gram equivalent weight with suitable examples; Strength of a solution, Normality, Molarity,

- Molality as applied in relation to a solution; Simple numerical problems related to volumetric analysis; Definition of pH, and different industrial applications of pH
- ELECTROLYSIS:** Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples; Faraday's Laws of Electrolysis; Simple numerical problems based upon the laws of electrolysis; Different industrial applications of 'Electrolysis'; Elementary account of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.
 - CHEMICAL KINETICS:** Rate constant, order and molecular of reaction, 1st, 2nd and 3rd order reaction, method of determination of order of reaction, activation rate.

TEXT BOOK

Kuriacose, J.C., Rajaram, J, "Chemistry in Engineering", Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th edition, 2009.

REFERENCE BOOKS

- Rabindra, S. and Mishra, B.K., "Engineering Chemistry", Kumar and Kumar Publishers (P) Ltd., 3rd edition, 2010.
- Kumar, S.S. "A Text Book of Applied Chemistry-I", Tata McGraw Hill, Delhi, 2nd edition, 2009.
- Jain, P.C and Jain .M, "Engineering Chemistry", S.Chand, 3rd edition, 2008.

CH-151-D	APPLIED CHEMISTRY-I LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

- Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
- Preparation of standard solution of oxalic acid or potassium dichromate
- Determine the strength of a given solution of sodium hydroxide with the help of a standard solution of oxalic acid
- Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid
- Find the amount of chlorides in mg per liter in a sample of H₂O with the help of a solution of AgNO₃
- Determine the degree of temporary hardness of water by O'Hehner's method
- Estimate the amount of Cu in a sample of CuSO₄ using a standard solution of Na₂S₂O₃
- Estimation of amount of iron in hematite ore volumetrically
- Estimation of total alkalinity of water volumetrically
- Determine conductance, pH of water sample using conductance bridge and Ph meter

IT-151-D	BASICS OF INFORMATION TECHNOLOGY LAB	L-T-P	Cr
		0-1-2	2

OBJECTIVE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

1. Teaching of theory should be dovetailed with practical work
2. The following topics may be taught in the laboratory along with the practical exercises.

LIST OF EXPERIMENTS

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. Practice in installing the operating system window XP and loading application software.
4. Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, BACKUP commands
5. Exercises on entering text and data (Typing Practice)
6. Practice with MS-Word with the following utilities:
 - (a) File management
 - (b) Page setup
 - (c) Formation of a document
7. Practice with MS-Word with the following utilities:
 - (a) Formatting paragraph
 - (b) Tables and borders
 - (c) Drawing toolbar
 - (d) More than one window
8. Practice with Ms-Excel
 - (a) Starting Ms-Excel
 - (b) Menu Commands
 - (c) Work books
 - (d) Editing worksheets
9. Practice with Ms-Excel with the following utilities:
 - (a) Creating and formatting of chart
 - (b) Customize MS-Excel
10. Practice with Ms-PowerPoint
11. Identification of various hardware devices used in a LAN.

- (a) LAN card
 - (b) Router
 - (c) Modem
 - (d) Switch
 - (e) HUB
 - (f) Physical Media and Connectors
12. Creating a Local Area Network
 13. Internet and its Applications
 - (a) Log-in to internet
 - (b) Navigation for information seeking on internet
 - (c) Browsing and down loading of information from internet
 - (d) Sending and receiving e-mail

REFERENCE BOOKS

1. Rajaraman, V, "Fundamentals of Computer", Prentice Hall of India Pvt. Ltd., New Delhi, 5th edition, 2009.
2. Saxena. S, "MS-Office 2000 for Everyone", Vikas Publishing House Pvt. Ltd., 2nd edition, 2008.
3. Sinha, P.K., "Computer Fundamentals", BPB Publication, 3rd edition, 2010.

ME-151-D	ENGINEERING DRAWING - I	L-T-P	Cr
		0-1-4	3

OBJECTIVE

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.

Note:

1. First angle projection is to be followed
 2. Minimum of 15 sheets to be prepared by each student
 3. SP 46 - 1988 should be followed
 4. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students.
1. **DRAWING OFFICE PRACTICE:** Drawing instruments, Sizes and layout of standard drawing sheets; Sizes of drawing boards; Drafting table/board; Different types of Lines and Free Hand Sketching (1 sheet) - Different types of lines in engineering drawing as per BIS specifications; Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses; Lettering Techniques and Practice (2 sheets) - Instrumental single stroke (capital and inclined) lettering of 35 mm height in the ratios of 7:4; Instrumental double stroke lettering of 35 mm height in the ratio of 7:4, vertical; Free hand lettering (alphabet and numerals) lower case and upper

case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4

2. **DIMENSIONING (1 SHEET), SCALE (3 SHEETS):** Necessity of dimensioning, terms and notations - methods and principles, dimensioning small components as in 4.2 below (mainly theoretical instructions); Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches - chain and parallel dimensioning; Scales - their need and importance, Definition of representative fraction (RF); Find RF of a given scale; Types of scales; Construction of plain and diagonal scales.
3. **PRINCIPLE OF PROJECTIONS** (strictly in first angle projection) (8 sheets): Principle of orthographic projection; Projection of points situated in different quadrants; Projection of lines, Lines inclined to one plane and parallel to the other and vice versa; Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa; Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both.
4. **ORTHOGRAPHIC AND ISOMETRIC VIEWS:** Drawing 3 orthographic views of given objects (at least five objects); Drawing 6 views of given objects (non-symmetrical one or two objects may be selected for this exercise); Identification of surfaces on drawn orthographic views from isometric object drawn; Exercises on missing lines, surfaces and views; Sketching practice of pictorial views from isometric objects.
5. **SECTIONAL VIEWS** (2 sheets): Need for sectional views - cutting planes methods of representing sections, conventional sections of various material, classification of sections, conventions in sectioning; Drawing of full section, half section, partial broken out sections, off-set sections, revolved sections and removed sections. Exercises on sectional views of different isometric views; Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections.
6. **ISOMETRIC VIEWS** (2 sheets): Fundamentals of isometric projections (theoretical instructions); Isometric views from 2 or 3 given orthographic views.
7. **INTRODUCTION TO THIRD ANGLE PROJECTION** (1 sheet):

Note: Minimum 15 drawing sheets will be prepared by the students
REFERENCE

REFERENCE BOOKS

1. Bhatt, N.D., "Elementary Engineering Drawing (in first angle projection)", Charotar Publishing House, 13th edition, 2010.
2. Singh, S, "A Text Book of Engineering Drawing", Dhanpat Rai and Co., Delhi, 5th edition, 2010.

ME-152-D	GENERAL WORKSHOP PRACTICE - I	L-T-P	Cr
		0-1-4	3

OBJECTIVE

Manual abilities to handle engineering materials with hand tools need to be developed in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides developing the necessary skills, the students will appreciate the importance of quality and safety measures.

Note:

1. The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.
2. The shops to be offered in I and II semester may be decided at polytechnic level
3. The students should be taken to various shops (not included in the curriculum) in the polytechnic in batches and should be given knowledge of the various machines/equipment. Such as machine shop, foundry shop, sheet metal shop, etc.
4. Students of Diploma in Civil Engineering will undergo Shops 1 to 6 only

Following seven shops are being proposed:

1. Carpentry shop
2. Fitting and plumbing shop
3. Welding shop
4. Paint shop
5. Forging and sheet metal shop
6. Electric shop
7. Electronics Shop

1. **CARPENTRY SHOP:** Introduction to various types of wood, carpentry tools - their identification with sketches. Different types of wood joints; Simple operations viz. hand sawing, marking, planning; Introduction and sharpening of wood working tools and practice of proper adjustment of tools; Demonstration and use of wood working machines i.e. band saw, circular saw, rip saw, bow saw and trammels. Universal wood working machine and wood turning lathe;
2. **FITTING AND PLUMBING SHOP:** Introduction to fitting shop, common materials used in fitting shop, description and demonstration of various types of work-holding devices and surface plate, V-block; Demonstration and use of simple operation of hack-sawing, demonstration of various types of blades and their uses; Demonstrate and use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes

etc.); Introduction of chipping, demonstration on chipping and its applications, Demonstration and function of chipping tools; Description, demonstration and practice of simple operation of hack saw, straight and angular cutting; Demonstrations, description and use of various types of blades - their uses and method of fitting the blade; Introduction and use of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge; Description, demonstration and practice of thread cutting using taps and dies; Plumbing: Descriptions and drawing of various plumbing shop tools, Safety precautions. Introduction and demonstration of pipe dies, Pipe holding devices, Demonstration and practice of Pipe Fittings such as Sockets, Elbow, Tee, Reducer, Nipple, Union coupling, plug, Bend, Float valves and Taps

3. **WELDING SHOP:** Introduction to welding, type of welding, common materials that can be welded, introduction to gas welding equipment, types of flame, adjustment of flame, applications of gas welding. Welding tools and safety precautions; 3.2 Introduction to electric arc welding (AC and DC), practice in setting current and voltage for striking proper arc, precautions while using electric arc welding. Applications of arc welding. Introduction to polarity and their use; Introduction to brazing process, filler material and fluxes; applications of brazing. Use of solder. Introduction of soldering materials; Demonstrate and use of the different tools used in the welding shop with sketches. Hand shield, helmet, clipping hammer, gloves, welding lead, connectors, apron, goggles etc.; Demonstration of welding defects and Various types of joints and end preparation
4. **PAINT SHOP:** Introduction of painting shop and necessity. Different types of paints. Introduction of powder coating plant and their uses.
5. **FORGING AND SHEET METAL SHOP:** Introduction to forging, forging tools, tongs, blowers/pressure blowers, hammers, chisels, punch, anvil, swag-block etc. Forging operations; Forge a L hook or Ring from MS rod 6 mm ϕ ; Forge a chisel and give an idea of hardening and tempering; Lap joint with forge welding; High Strength Steel (HSS) tools - forging of Lathe shaper tools like side-tools and V-shape tools; Making sheet metal joints; Making sheet metal tray or a funnel or a computer chassis; Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering; Prepare a lap riveting joint of sheet metal pieces.
6. **ELECTRIC SHOP:** Demonstration of tools commonly used in Electric Shop; Safety precautions, electric shock treatment; Demonstration of Common Electric material like: wires, fuses, ceiling roses, battens, cleats and allied items; Demonstration of Voltmeter, Ammeter, Multimeter and Energy meter.
7. **ELECTRONICS SHOP:** Identification, familiarization, demonstration and use of the following electronic instruments: Multi-meter digital, Single beam simple CRO , function of every knob on the front panel, Power supply , fixed voltage and variable voltage, single output as well as dual output; Identification , familiarization and uses of commonly used tools; active and passive components; colour code and types of resistor and potentiometers; Cut, strip, join and insulate two lengths of wires/cables (repeat with different types of cables/ wires); Demonstrate and practice the skill to remove

components/wires by unsoldering; Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, capacitor, diodes, transistors on a PCB; Wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags; Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below: (a) Various types of plugs, sockets, connectors suitable for general-purpose audio video use. Some of such connectors e.g. 2 and 3 pin mains plug and sockets, Banana plugs, sockets and similar male and female connectors and terminal strips. (b) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT, band selector, multi-way Master Mains Switch; Exposure to modern soldering and de-soldering processes (Field visits); De-solder pump, remove and clean all the components and wires from a given equipment, a PCB or a tag strip.

EN-102-D	COMMUNICATION SKILLS - II	L-T-P	Cr
		2-0-0	2

OBJECTIVE

Language is the most commonly used and effective medium of self-expression in all spheres of human life - personal, social and professional. A student must have a fair knowledge of English language and be able to pursue the present course of study and handle the future jobs in industry. The objective of this course is to assist the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, develop grammatical ability, enhance writing skills, correspond with others, enhance skills in spoken English.

- PROSE TEXT BOOK:** The following six chapters of A Book of English for Polytechnics - Prose Selection, Published by MacMillan India Ltd., on behalf of Technical Teachers' Training Institute, Chandigarh – (a) Uncle Podger Hangs a Picture (b) Subash Chandra Bose (c) A Pair of Mustachios (d) Guru Gobind Singh (e) With The Photographer (f) Sir Jagdish Chandra Bose.
- PRECISE WRITING:** Selected from the prescribed 6 chapters of Prose Text Book
- GRAMMAR:** Change of words into different parts of speech
VOCABULARY: words, idioms, phrases, antonyms and synonyms, foreign words and phrases; Translation of 100 most popular administrative terms from English to Hindi and from Hindi to English
- CORRESPONDENCE:** (a) Business letters such as - Registration as supplier, Floating quotations and tenders, Quarry for product specification, price and other details etc from a firm/Company, Covering letter for quoting prices against a quotation/tender, Placing supply order (b) Personal letters such as - Application for leave and extension of leave, Application for seeking a job/employment, Conveying congratulation messages to a

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relative/friend/colleague on different occasions, Conveying condolence message to a relative/friend/colleague, Request letter to guardian for sending money for excursion/study tour Letter to your brother/sister/friend describing your first day experience in the polytechnic, (c) Official letters such as: Letter to editor for placing an advertisement in the newspaper for purchase/selling of goods, Letter to Municipal Commissioner for improving water supply/sanitation system in your locality, Letter to General Manager, Telephone Department for restoring a dead telephone/shifting a telephone, Letter to State Electricity Board for repair of street lighting/correction of bills etc., Letter to the supplier for rectifying or replacing a defective machinery/item of purchase, Letter to Registrar, State Board of Technical Education for allowing to improve grades/marks in diploma examination

5. **REPORT WRITING:** Drafting a technical report of a visit to a factory, construction site, modern office, etc.; Report writing on current general themes/topics related to economy, industry, social issues; Elements of periodical progress report.

INSPECTION NOTE: Write an inspection note after inspecting technical/industrial goods; Write an inspection note after visiting a construction site or production; shop

A PARAGRAPH ON CURRENT TOPICS/THEMES: Technology, Science; Economy; Politics; Social; General.

6. **DRAFTING:** Press notes; Memos/circulars; Notices (lost and found: obituary/auction, etc); Telegrams; Press releases; Agenda and minutes of the meeting; Personal resume/curriculum vitae;
7. **COMMUNICATION TECHNIQUES:** Importance of communication; Types of communication - verbal and non-verbal; One way and two way communication; Process of communication - horizontal, vertical, upward, downward; Essentials of good communication; Level of communication - inter and intra personal, group to person, group to group; Methods of effective oral, written and non-verbal communication, Horizons - tone, frequency, rate, volume, depth; Barrier to communication and over coming barriers; Listening skill; Use of audio visual aids for effective communication

TEXT BOOK

Pal and Roruailling, "Essentials of Business Communication", 3rd edition, Sultan Chand and Sons

REFERENCE BOOKS

1. Ludlow and Panthon, "The Essence of Effective Communication", Prentice Hall of India
2. Kohli, AL, "New Design English Grammar Reading and Writing Skills" (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh.
3. Kohli, MK and Kohli , AL, "New Design English Reading and Advanced Writing Skills for Class XI and XII", Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
4. Sasikumar, V and Dhamija, PV, "Spoken English", Tata McGraw Hill
5. Taylor, Grount, "English Conversation Practice", Tata McGraw Hill

6. Mohan, Krishna and Banerji, Meera, "Developing Communication Skills"; MacMillan India Ltd., Delhi
7. Sharma, RC and Mohan, Krishna, "Business Correspondence and Report Writing" Tata McGraw Hill Publishing Company Ltd. New Delhi
8. Roy, R. Datta and Dhir, KK, "Communication Skills", Vishal Publication, Jalandhar
9. "Intermediate use of Grammar and Composition" by Orient Longman.

EN-152-D	COMMUNICATION SKILLS – II LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS/EXERCISES

1. Presentation of Technical Report, using Audio-visual aids
2. Preparation and Presentation on a Seminar of a given topic/theme using power- point
3. Telephonic conversation - Conveying and Receiving
4. Mock Exercises for an interview for a job/employment
5. Listening comprehension from a radio/cassette talk in English
6. Extempore speech
7. Paper reading
8. Group Discussion
9. Documentation of data collected
10. Oral presentation with stress on proper body language, voice modulation

Note: For reading comprehension, listening comprehension and effective speaking skills, English Language Laboratory Manual and Workbook published by State Board of Technical Education, Hyderabad (AP) may be used along with text book

MA-102-D	APPLIED MATHEMATICS - II	L-T-P	Cr
		3-1-0	4

OBJECTIVE

Applied Mathematics forms the backbone of engineering discipline. Basic elements of differential calculus, integral calculus, differential equations and coordinate geometry have been included in the curriculum as foundation course and to provide base for continuing education to the students

1. **CO-ORDINATE GEOMETRY:** Area of a triangle, centroid and incentre of a triangle (given the vertices of a triangle), Simple problems on locus; Equation of straight line in various standard forms (without proof) with their transformation from one form to another, Angle between two lines and perpendicular distance formula (without proof)
2. **CIRCLE:** General equation and its characteristics given - The center and radius, Three points on it, The co-ordinates of the end's of the diameter;

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Conics (parabola, ellipse and hyperbola), standard equation of conics (without proof), given the equation of conic to calculate foci, directrix, eccentricity, latus rectum, vertices and axis related to different conics
Differential Calculus

3. **DIFFERENTIAL CALCULUS:** Concept of function, four standard limits -
$$\lim_{x \rightarrow a} \frac{(x^n - a^n)}{(x - a)}, \quad \lim_{x \rightarrow 0} \frac{\sin x}{x}, \quad \lim_{x \rightarrow 0} \frac{(a^x - 1)}{x},$$

$$\lim_{x \rightarrow 0} (1 + x)^{1/x};$$
 Concepts of differentiation and its physical interpretation -

Differentiation by first principle of x^n , $(ax + b)^n$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\operatorname{cosec} x$ and $\cot x$, e^x , $\log x$. Differentiation of a function of a function and explicit and implicit functions. Differentiation of sum, product and quotient of different functions. Logarithmic differentiation. Successive differentiation.

4. **APPLICATION OF DERIVATIVES:** Application of derivatives for (a) rate measure (b) errors (c) real root by Newton's method (d) equation of tangent and normal (e) finding the maxima and minima of a function (simple engineering problems)
5. **INTEGRAL CALCULUS:** Integration as inverse operation of differentiation; Simple integration by substitution, by parts and by partial fractions; Evaluation of definite integrals (simple problems) by explaining the general properties of definite integrals.
6. **APPLICATIONS OF INTEGRATION:** Simple problem on evaluation of area under a curve where limits are prescribed; Calculation of volume of a solid formed by revolution of an area about axis (simple problems) where limits are prescribed; To calculate average and root mean square value of a function; Area by Trapezoidal Rule and Simpson's Rule.
7. **DIFFERENTIAL EQUATIONS:** Solution of first order and first degree differential equation by - Variable separation; Homogeneous differential equation and reducible homogeneous differential equations; Linear differential equations and reducible linear differential equations

TEXT BOOK

Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi, 14th edition, 2010.

REFERENCE BOOKS

1. Mathur, A.B., Jagi, V.P., "Advanced Engineering Mathematics" Khanna Publishers, Delhi, 3rd edition, 2008.
2. Grewal, B.S., "Engineering Mathematics", Khanna Publishers, Delhi, 14th edition, 2010.
3. Chawla, C.D., "Engineering Mathematics", Asian Publishers, New Delhi, 2nd edition, 2010.

PH-102-D	APPLIED PHYSICS - II	L-T-P	Cr
		3-0-0	3

OBJECTIVE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

- 1. APPLICATIONS OF SOUND WAVES:** Acoustics of buildings - reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time; Ultrasonics - production (magnetostriction and piezoelectric) and their engineering applications.
- 2. PRINCIPLE OF OPTICS:** Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection; Defects in image formation by lenses and their correction; Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case); Overhead projector and slide projector
- 3. ELECTROSTATICS:** Coulombs law, unit charge; Gauss's Law; Electric field intensity and electric potential; Electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet; Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors; Dielectric and its effect on capacitors, dielectric constant and dielectric break down
- 4. ELECTRICITY:** Ohm's law; Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance; Kirchoff's laws, wheatstone bridge principle and its applications; Heating effect of current and concept of electric power;
- 5. SEMI CONDUCTOR PHYSICS:** Energy bands, intrinsic and extrinsic semi conductors, p-n junction diode and its characteristics; Diode as rectifier - half wave and full wave rectifier, semi conductor transistor pnp and npn (concept only)
- 6. MODERN PHYSICS:** Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium - neon and ruby lasers and applications; Fibre optics: Introduction, optical fiber materials, types, light propagation and applications.
- 7. SUPER CONDUCTIVITY AND ENERGY SOURCES:** Super conductivity: Phenomenon of super conductivity, effect of magnetic field, critical field, type I and type II super conductors and their applications); Energy sources - conventional and non-conventional (wind, water, solar, bio, nuclear energy), only elementary idea

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TEXT BOOK

Gomber and Gogia, "Fundamental Physics - Volume I and II", Pardeep Publications, Jalandhar, 7th edition, 2010.

REFERENCE BOOKS

1. Gaur, R.K., "Basic Applied Physics", Dhanpat Rai Publications, 5th edition, 2010.
2. Jaiswal, J.N., "Comprehensive Practical Physics - Volume I and II", Laxmi Publishers, 2nd edition, 2010.
3. Resnick and Halliday, "Fundamentals of Physics", Asian Books Pvt. Ltd., New Delhi, 14th edition, 2009.
4. Verma, H.C., "Concepts in Physics", Bharti Bhawan Ltd., New Delhi, 3rd edition, 2010.

PH-152-D	APPLIED PHYSICS - II LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. To verify Ohm's law
2. To verify law of resistances in series and in parallel
3. To determine the magnifying power of a compound microscope
4. To determine the magnifying power of an astronomical telescope
5. To convert a galvanometer into an ammeter of a given range
6. To convert a galvanometer into a voltmeter of a given range
7. To find the wavelength of a He-Ne laser
8. To find the frequency of a tuning fork by a sonometer
9. To study characteristics of a pn junction diode
10. To find the resistance of a wire using a metre bridge.

CH-102-D	APPLIED CHEMISTRY-II	L-T-P	Cr
		2-0-0	2

OBJECTIVE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

1. **METALLURGY:** A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations; Metallurgy of (i) Aluminium (ii) Iron with their physical and chemical properties; Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar
2. **FUELS:** Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples; 2.2 Definition of Calorific value of a fuel and determination of calorific value of a liquid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values; Brief description of 'Proximate' and 'Ultimate' analysis of a fuel.; Importance of conducting the proximate and ultimate analysis of a fuel; Qualities of a good fuel and merits of gaseous fuels over those of other varieties of fuels; Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas
3. **CORROSION AND IT'S CAUSES:** Meaning of the term 'corrosion' and its definition; Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory (wet corrosion, water line corrosion, galvanic corrosion, stress corrosion) (iii) Factors affecting corrosion (iv) Nature of corroding environment.
4. **PREVENTION OF CORROSION:** Alloying, Providing metallic coatings; Cathodic protections – Sacrificial, Impressed voltage method; anodic protection; material selection and proper designing.
5. **LUBRICANTS:** Definition of (i) lubricant (ii) lubrication; Classification of lubricants; Principles of lubrication - (i) fluid film lubrication (ii) boundary lubrication (iii) extreme pressure lubrication; Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.
6. **CEMENT AND GLASS:** Manufacture of Portland Cement; Manufacture of ordinary glass and lead glass.
7. **CLASSIFICATION AND NOMENCLATURE OF ORGANIC COMPOUNDS:** Classification of Organic Compounds, functional group, Homologous Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

TEXT BOOK

Kuriacose, J.C. and Rajaram, J., "Chemistry in Engineering", Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th edition, 2009.

REFERENCE BOOKS

1. Rabindra, S and Mishra, B.K., "Engineering Chemistry", Kumar and Kumar Publishers (P) Ltd., 3rd edition, 2010.
2. Kumar, S.S., "A Text Book of Applied Chemistry-I", Tata McGraw Hill, Delhi, 2nd edition, 2009.
3. Jain, P.C. and Jain, M, "Engineering Chemistry", S. Chand, 3rd edition, 2008.

CH-152-D	APPLIED CHEMISTRY-II LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Determine the viscosity of a given oil with the help of "Redwood viscometer"
4. Determine the flash point of the given oil with the help of Abel's Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
9. Determination of copper in the given brass solution, or sample of blue vitriol volumetrically
10. Detection of metal iron in the rust (solution of rust in concentrated HCL may be given).

ME-103-D	APPLIED MECHANICS	L-T-P	Cr
		3-0-0	3

OBJECTIVE

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

1. **INTRODUCTION:** Concept of engineering mechanics, definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields; Concept of rigid body.
2. **LAWS OF FORCES:** Different force systems (coplanar and non-coplanar), principle of transmissibility of forces; Parallelogram law of forces, triangle law of forces, polygon law of forces (graphically and analytically) resolution of forces, resolving a force into two rectangular components; Free body diagram; Equilibrium force and its determination; Lami's theorem.
3. **MOMENT:** Concept of moment; Moment of a force and units of moment; Varignon's theorem (definition only); Principle of moment and its applications; Parallel forces (like and unlike) and calculating their resultant; Concept of couple, its properties and effects; General conditions of equilibrium of bodies under co-planar forces; Position of resultant force by moment.
4. **FRICTION:** Definition and concept of friction, types of friction; Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction; Equilibrium of a body lying on a horizontal plane, equilibrium of a

- body lying on a rough inclined plane, friction in simple screw jack; Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force: (a) acting along the inclined plane, (b) horizontally (c) at some angle with the inclined plane.
- 5. CENTRE OF GRAVITY:** Concept, definition of center of gravity and centroid of plain figure and symmetrical solid body; Determination of centroid of plain and composite lamina using moment method, centroid of bodies with removed portion; Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion Removed.
 - 6. APPLICATION OF THE LAWS OF MOTION:** Simple problems on second law of motion, piles, lift, bodies tied with strings.
 - 7. SIMPLE MACHINES:** Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machine; Simple and compound machine; Definition of ideal machine, reversible and self locking machine; Effort lost in friction, determination of maximum mechanical advantage and maximum efficiency; System of pulley (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency; Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double purchase winch crab, expression for their velocity ratio and field of their application.

Note: Simple problem/numericals may be included in all the above topics wherever feasible

TEXT BOOK

Tayal, A.K., "Engineering Mechanics", Umesh Publications, Delhi, 2nd edition, 2010.

REFERENCE BOOKS

1. Khurmi, R.K., "A Text Book of Engineering Mechanics (Applied Mechanics)", S Chand and Co. Ltd., New Delhi, 8th edition, 2010.
2. Bhavikatti, SS, and Rajashekarappa, KG, "Engineering Mechanics", Wiley Eastern Ltd., New Delhi, 2nd edition, 2010.
3. Ramamurtham, S, "Engineering Mechanics and Strength of Materials", Dhanpat Rai Publishing, 3rd edition, 2009.
4. Basu, AB, "Engineering Mechanics", Tata McGraw Hill Publishing, 2nd edition, 2008.

ME-153-D	APPLIED MECHANICS LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Verification of the following laws:
 - a) Parallelogram law of forces
 - b) Triangle law of forces

Engineering Diploma Programme

- c) Polygon law of forces
2. To verify the forces in different members of a jib crane
3. To verify the reaction at the supports of a simply supported beam
4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel
7. To find mechanical advantage, velocity ratio and efficiency of single purchase winch crab
8. To find center of gravity of regular lamina
9. To find center of gravity of irregular lamina
10. To determine coefficient of friction between different surfaces on horizontal plane

ME-154-D	ENGINEERING DRAWING - II	L-T-P	Cr
		0-1-4	3

OBJECTIVE

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

Note:

1. First angle projection is to be followed
 2. Minimum of 15 sheets to be prepared by each student
 3. SP 46 - 1988 should be followed
 4. Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students
-
1. **DETAIL AND ASSEMBLY DRAWING** (2 sheets): Principle and utility of detail and assembly drawings; Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint, Corner and Through halving joint, Closed Mortise and Tenon joint.
 2. **THREADS** (3 sheets): Nomenclature of threads, types of threads (metric), single and multiple start threads; Forms of various external thread sections such as V, square and acme; threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads; Simplified conventions of left hand and right hand threads, both external and internal threads; Locking Devices (1 sheet); Lock nuts, castle nuts, split pin nuts, sawn nuts, slotted nut; Nuts and Bolts (3 sheets) Different views of hexagonal and square nuts; Different views of hexagonal and square nuts; Assembly of hexagonal headed, square

- headed, square headed with square neck bolts with hexagonal and square nuts and washers. Foundations bolts - Rag bolt and Lewis bolt
3. **SCREWS, STUDS AND WASHERS** (1 sheet) : Drawing various types of machine screws; Drawing various types of studs and set screws
KEYS AND COTTERS (3 sheets): Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position; Cotter joints (i) sleeve and cotter joint (ii) gib and cotter joint (iii) knuckle joint (iv) Spigot and socket joint
RIVETS AND RIVETED JOINTS (2 sheets): Types of structural and general purpose rivet heads Caulking and fullering of riveted joints; 7.3 Types of riveted joints - lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig - zag riveting.
WELDED JOINTS (1 sheet): Various conventions and symbols of welded joints (IS 696); Practical applications of welded joints say joints on steel frames, windows, doors and furniture
 4. **COUPLINGS** (2 sheets): Muff or Box coupling, half lap muff coupling; Flange coupling (Protected and non-protected); Flexible coupling
SYMBOLS AND CONVENTIONS (2 sheets): Civil engineering sanitary fitting symbols; Electrical fitting symbols for domestic interior installations; Building plan drawing with electrical and civil engineering symbols
 5. **DEVELOPMENT OF SURFACES** (3 sheets): Construction of geometrical figures such as square, pentagon, hexagon; Development of surfaces of cylinder, square, pentagonal and hexagonal, Prism, Conc and Pyramid, Sequence pentagonal and hexa pyramid
 6. **INTERPENETRATION** (2 sheets): Cylinder to cylinder; Cylinder to cone
 7. **AUTO CAD**: Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode; Drawing commands - point, line, arc, circle, ellipse; Editing commands - scale, erase, copy, stretch, lengthen and explode; Dimensioning and placing text in drawing area; Sectioning and hatching; Inquiry for different parameters of drawing entity.

Note: A minimum of 15 sheets should be prepared by each student

REFERENCE BOOKS

1. Bhatt, N.D., "Elementary Engineering Drawing (in first angle projection)", Charotar Publishing House, 13th edition, 2010.
2. Singh, S, "A Text Book of Engineering Drawing", Dhanpat Rai and Co.Delhi, 5th edition, 2010.

ME-155-D	GENERAL WORKSHOP PRACTICE - II	L-T-P	Cr
		0-1-4	3

Refer to ME-152-D for details.

CS-101-D	PROGRAMMING IN C	L-T-P	Cr
		2-0-0	2

OBJECTIVE

Computers play a vital role in present day life, more so, in the professional life of technician engineers. People working in field/ computer industry use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers. The knowledge of C language will be reinforced by the practical exercises.

Note:

The subject is totally practical based. Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to write algorithm and then write program for the algorithm and run on computer. It is required that students should maintain records (files with printouts).

1. **ALGORITHM AND PROGRAMMING DEVELOPMENT:** Steps in development of a program; Flow charts, Algorithm development; Structured and non-structure languages; program debugging compiler vs interpreter
2. **C PROGRAM STRUCTURE:** I/o statements, assign statements; Constants, variables and data types; Operators and Expressions; Standards and Formatted.
3. **CONTROL STRUCTURES:** Introduction; Decision making with IF – statement; IF - Else and Nested IF; While and do-while, for loop; Break and switch statements.
4. **FUNCTIONS:** Introduction to functions; Global and Local Variables; Function Declaration; Standard functions; Call - by value/reference; recursion.
5. **ARRAYS:** Introduction to Arrays; Array Declaration and initializations; Single and Multidimensional Array; Arrays of characters; passing arrays to functions.
6. **POINTERS:** Introduction to Pointers; Address operator and pointers; Declaring and Initializing pointers; Assignment through pointers; Pointers and Arrays; pointer to function.
7. **STRUCTURES AND UNIONS:** Declaration of structures; Accessing structure members; Arrays of structure; passing structure to functions; Unions.

TEXT BOOK

Kanetkar, Y., "Let us C", BPB Publications, 5th edition, 2010.

REFERENCE BOOKS.

1. Kanetkar, Y, "Exploring C", BPB Publications, 3rd edition, 2010.
2. Subburaj, R, "Programming in C", Vikas Publishing House Pvt., 2nd edition, 2009.

- Balaguruswami, C, "Programming with C Language", Tata McGraw Hill, 2nd edition, 2008.
- Mahapatra, BP, "Programming in C", Khanna Publishers, 1st edition, 2008.

CS-151-D	PROGRAMMING IN 'C LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

- Programming exercises on executing and editing a C program.
- Programming exercises on defining variables and assigning values to variables.
- Programming exercises on arithmetic and relational operators.
- Programming exercises on arithmetic expressions and their evaluation
- Programming exercises on formatting input/output using printf and scanf.
- Programming exercises using if statement and if Else statement
- Programming exercises on switch statement.
- Programming exercises on do - while statements and for-statement
- Programs on one-dimensional array and multi-dimensional array.
- (i) Programs for putting two strings together,
(ii) Programs for comparing two strings.
- Simple programs using structures.
- Simple programs using pointers.

EL-101-D	BASIC ELECTRICAL ENGINEERING	L-T-P	Cr
		3-0-0	3

OBJECTIVE

This course will enable the students to understand the basic concepts and principles of d.c and a.c fundamental, a.c circuits, batteries, electromagnetic induction etc. including constant voltage and current sources. A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to fault location etc. In addition, he may be working in testing laboratories where he uses measuring instruments. To carry out these and similar jobs effectively, knowledge of basic concepts, principles and their applications is very essential.

- DC CIRCUITS:** Concept of electricity, various applications of electricity, advantages of electricity over other types of energy; basic terms - voltage, current, potential difference, power, energy and their units; Ohm's law and its practical applications, concepts of resistance, conductance, resistivity and their units; Effect of temperature on resistance, temperature coefficient of resistance; Series and parallel combination of resistors, wattage consideration, simple problems; Constant Voltage and Constant Current Sources - Concept of constant voltage source, symbol and graphical representation; characteristics of ideal and practical sources; Concept of

- constant current sources, symbol, characteristics and graphical representation of ideal and practical current sources.
2. **DC CIRCUIT THEOREMS:** Kirchhoff's current law and Kirchhoff's voltage law and their applications to simple circuits. Conversion of circuits from Star to Delta and Delta to Star; Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem, application of network theorem in solving d.c circuit problems.
 3. **ELECTRO MAGNETIC INDUCTION:** Concepts of magnetic field produced by flow of current, Magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit; Faraday's law and rules of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems; Concept of current growth, decay and time constant in an inductive (RL) circuit; Energy stored in an inductor, series and parallel combination of inductors.
 4. **BATTERIES:** Basic idea about primary and secondary cells; Construction, working and applications of Lead-Acid battery and Nickel-Cadmium cells, Silver-Oxide cells; Charging methods used for lead-acid battery (accumulator); Care and maintenance of lead-acid battery; Series and parallel connections of batteries; General idea of solar cells, solar panels and their applications
 5. **AC FUNDAMENTALS:** Concept of alternating voltage and current; Difference between a.c and d.c; Concept of cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor; Representation of sinusoidal quantities by phasor diagrams; Equation of sinusoidal wave form (with derivation); Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.
 6. **AC CIRCUITS:** Inductive reactance and Capacitive reactance; Alternating voltage applied to resistance and inductance in series; Alternating voltage applied to resistance and capacitance in series; Impedance triangle and phase angle; Solutions and phasor diagrams for simple RLC circuits (series and parallel); Introduction to series and parallel resonance and its conditions; Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, importance of power factor; j-notation and its application in solving a series and parallel AC circuits; Definition of conductance, susceptance and admittance
 7. **VARIOUS TYPES OF POWER PLANTS:** Brief explanation of principle of power generation in thermal, hydro and nuclear power stations and their comparative study; Elementary block diagram of above mentioned power stations.

TEXT BOOK

Theraja, BL, "Electrical Technology", S Chand and Co, 2nd edition, 2009.

REFERENCE BOOKS

1. Sahdev, SK, "Basic Electrical and Electronics Engineering", Dhanpat Rai and Sons, 3rd edition, 2008.
2. Sharma, B.R., "Basic Electricity", Satya Prakashan, New Delhi, 1st edition 2008.
3. Gupta, B.R., "Principles of Electrical Engineering", S Chand, 2nd edition, 2010.
4. Dhogal, P.S., "Basic Electrical Engineering", Tata Mc Graw Hill, 2nd edition, 2010.

EL-151-D	BASIC ELECTRICAL ENGINEERING LAB	L-T-P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter and multi-meter and other accessories
2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter
4. To verify in d.c circuits:
 - a. Thevenin's theorem,
 - b. Norton's theorem,
 - c. Super position theorem,
 - d. Maximum power transfer theorem,
5. To observe change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
6. Verification of Kirchhoff's Current Law and Kirchhoff's Voltage Laws in a dc circuit
7. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
8. To find the voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determine the power factor in each case.
9. To test a lead - acid storage battery and to charge it.
10. Measurement of power and power factor in a single phase R.L.C. circuit and to calculate active and reactive power.
11. Visit to a nearby Power Station(s).

EC-101-D	ANALOG ELECTRONICS - I	L-T-P	Cr
		2-0-0	2

OBJECTIVE

This subject gives the knowledge of fundamental concepts of basic electronics and aims at providing the students with basic understanding of conductors,

semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD; understanding the working of transistors in various configurations; understanding of FETs and MOSFET etc. for effective functioning in the field of electronic service industry. The teacher should give emphasis on understanding of concepts and explanation of various term used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visit

1. **SEMI CONDUCTOR PHYSICS:** Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Ge and Si; covalent bonds Concept of intrinsic and extrinsic semi conductor, P and N impurities, doping of impurity; P and N type semiconductors and their conductivity; Effect of temperature on conductivity of intrinsic semi conductor; Energy level diagram of conductors, insulators and semi conductors; minority and majority carriers.
2. **SEMI CONDUCTOR DIODE:** PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in forward and reverse bias condition; V-I characteristics, static and dynamic resistance and their calculation from diode characteristics; Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and π filter; Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.
3. **BIPOLAR TRANSISTOR:** Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; Current relations in transistor; concept of leakage current; CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB CE and CC Configurations; Transistors as an amplifier in CE Configurations; d.c load line and calculation of current gain, voltage gain using d.c load line.
4. **TRANSISTOR BIASING CIRCUITS:** Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.
5. **TRANSISTOR AMPLIFIER:** Single stage transistor amplifier circuit, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H- parameters and their significance. Calculation of current gain, voltage gain, input impedance and output impedance using h-parameter.
6. **FIELD EFFECT TRANSISTORS(FETs):** Construction, operation and characteristics of FET and its application. Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications. C MOS- advantages and applications Comparison of JFET, MOSFET and BJT. FET amplifier circuit and its working principle. (No analysis).

7. **POWER AMPLIFIERS AND FEEDBACK:** Amplifiers, classification of amplifiers, R-c coupled amplifiers, low frequency response of R-c coupled amplifier, cascade amplifiers, class A, class B, class C amplifier, push pare amplifiers, feedback concept in an amplifier and negative feedback in amplifiers.

TEXT BOOK

Millman and Halkias, C, "Electronics Devices and Circuits", McGraw Hill, 4th edition, 2010.

REFERENCE BOOKS

1. Bhargava, N.N. and Kulshreshta, "Basic Electronics and Linear Circuit", Tata McGraw Hill Publishing, 4th edition, 2008.
2. Mehta, VK, "Principles of Electrical and Electronics Engineering", S Chand and Co., 2nd edition.
3. Dhir, SM, "Electronic Components and Materials", Tata McGraw Hill Publishing, 3rd edition.
4. Malvino, AP, "Principles of Electronics", Tata McGraw Hill Publishing, 4th edition, 2009.

EC-151-D	ANALOG ELECTRONICS – I LAB	L-T-P	Cr
		0-0-2	

LIST OF EXPERIMENTS

1. Familiarization with operation of following instruments.
2. Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant quantities with their help.
3. Plot V-I characteristics for PN junction diode
4. Plot V-I characteristics of Zenor diode
5. Observe the wave shape of following rectifier circuit
 - a. Half wave rectifier
 - b. Full wave rectifier
 - c. Bridge rectifier
6. Plot the wave shape of full wave rectifier with
 - a. Shunt capacitor filter
 - b. Series inductor filter
 - c. TT filter
7. Plot input and output characteristics and calculate parameters of transistors in CE configuration.
8. Plot input and output characteristics and calculate of parameters of transistors in CB configuration.
9. Plot V-I characteristics of FET amplifier.
10. Measure the Q-Point and note the variation of Q-Point.
 - a. By increasing the base resistance in fixed bias circuit.
 - b. By changing out of bias resistance in potential divider circuit.

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11. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit.

PD-191-D	CO-CURRICULAR ACTIVITIES	L-T-P	Cr
			1

OBJECTIVE

To help the students in their all round growth and acquire attributes like team spirit, organizational ability, leadership qualities, etc.

OPERATION

1. The students are to take part in Extra / Co-curricular activities outside contact hours through clubs / societies etc.
2. The students' performance will be evaluated in the second year.
3. Students are required to register in each year for this course.

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CAMPUS

Nachauli, Old Faridabad - Jasana Road, Faridabad-121002

Ph: 91-129-3064500-505, Fax: 91-129-2202615

ADMIN. OFFICE

C-72, Shivalik, Malviya Nagar, New Delhi-110017

Ph: 91-11-40719000, Fax: 91-11-40719023

E-mail: lu@lingayasuniversity.edu.in

Website: lingayasuniversity.edu.in