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**PREFACE**

Jatiya Kazi Kazi Nazrul Islam University was established by the Government of Bangladesh on 01 March 2005. The academic program of this university was stated on 03 June 2007 with four departments under two faculties. The department of Computer Science and Engineering (CSE) is one of them. With this continuation, CSE was started in 2007 with a vision to meet national development needs and global challenges in IT through quality teaching, learning, research and knowledge dissemination. The department of CSE is therefore aware of proving quality education. We have excellent and bright young brand of teachers who are deeply committed to the university to bring out best graduates in academic disciplines. As a result, nearly five hundreds of graduates have been produced who are occupying top positions in the country and abroad. Currently we are providing four academic degrees, such as Bachelor of Science in Engineering (B.Sc Engg.), Master of Science (MS), Master of Philosophy (M.Phil) and Doctor of Philosophy (Ph.D. We provide not only a world-class teaching atmosphere for the core areas of CSE — including programming, computer architecture, networking, mobile and distributed computing, artificial intelligence, data and information systems, the theory of computation, artificial intelligence, and computer graphics — but also high quality research environment of interdisciplinary areas, such as Neural and Speech Signal Processing, Telemedicine, Data Mining, Network Security, Image Processing and BCI to ensure the STEM education. We are committed to be an integral part in the struggle of Bangladesh for sustainable growth and development for Fourth Industrial Revolutions.

This curriculum provides general information about course system, such as rules and regulations relating to admission, grading system, performance evaluation, and requirement for degrees. It describes the course requirements, detailed course outline and courses offered in different semesters. Some of the information recorded in this syllabus is likely to be modified from time to time. It is hoped that this curriculum will be of much use to everybody concerned.

|  |  |
| --- | --- |
| Trishal,Mymensingh-2224, Bangladesh. | Professor Mst. Jannatul Ferdous, PhD  Head of the Department  Dept. of Computer Science and Engineering |

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**Course Curriculum**

***of***

**Bachelor of Science in Engineering,**

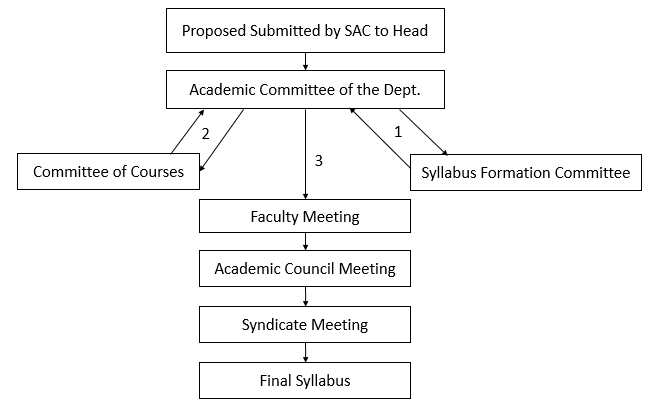
**Department of Computer Science in Engineering**

The Department of Computer Science and Engineering is one of the premier departments of Jatiya Kabi Kazi Nazrul Islam University (JKKNIU). The Department is currently offering four academic degrees. These are Bachelor of Science in Engineering (B.Sc Engg.), Master of Science (MS), Master of Philosophy (M.Phil) and Doctor of Philosophy (Ph.D). This curriculum is designed for those students of JKKNIU of session 2020-21 who will pursue their B.Sc. Engg. degree in CSE. The curriculum refers to a well-defined and prescribed course of studies, lessons and activities. This curriculum will guide our students in understanding the basic and advance engineering methodologies and technologies. The students of CSE Department must complete this curriculum to fulfill the requirements for acquiring the B.Sc. Engg. degree. While following, the curriculum will motivate students for learning and enhance their capability in creative thinking, professional attitude, economic judgment and environmental awareness.

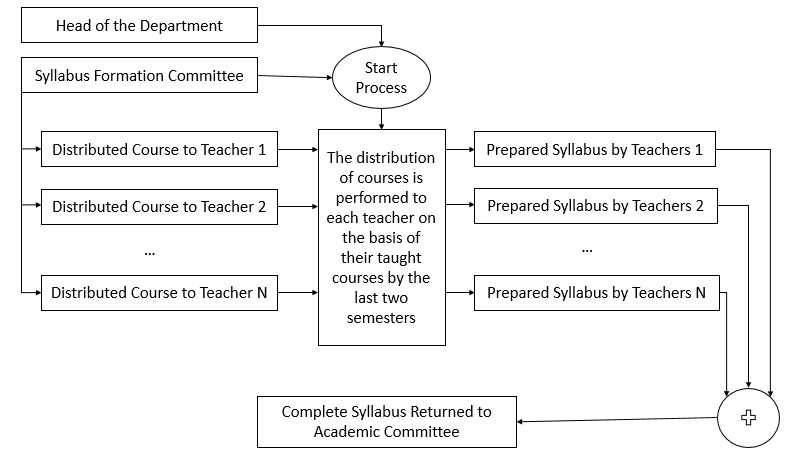
**1. Process of Curriculum Design**

The design of curriculum is done such a way so that a graduate can acquire a good amount of knowledge from relevant areas with his/her core engineering field. The curriculum of the B.Sc. Engg. degree in CSE is as proposed by the Syllabus Advisory Committee (SAC) to head of the department and approved by Academic Committee of the department. The approved syllabus is then forwarded to Syllabus Formation Committee (SFC) which later reviewed by Committee of courses. Finally, it’s gone throw the Faculty meeting, Academic Council meeting to the Syndicate meeting for ultimate approval. The Academic Committee review from time to time and recommend to the Faculty for change of curriculum and syllabi, as considered necessary. The overview of the process is shown in Figure-1.

The Syllabus Formation Committee and Head of the Department jointly start the process of syllabus formation. Each of the faculty members are distributed and instructed to submit course outlines which they taught in last two semesters. Finally, a complete syllabus is prepared from all the gathered documents and returned to the Academic Committee. The overview of the process is shown in Figure-2.

****

**Figure-1: Process of Curriculum Design**

****

**Figure-2: Task of Syllabus Formation Committee**

**2. Program Documentation**

From the academic session 2006-2007, the university has introduced course system for undergraduate studies. The rules and regulations for administering undergraduate curricula through the Course System have been applicable to students henceforth. This new course system has been introduced with an aim of creating a continuous, even and consistent workload throughout the term for the students. A student, whose background or capacity for assimilation is lower, is permitted to complete the program at a slower pace by studying a fewer number of courses during a given term, subject to a minimum course load.

The Academic program of Bachelor of Science in Engineering is of 4 (four) years duration divided into 8 (eight) semesters, each of the 19 (nineteen) weeks duration and a total of 165 credit hours. There are two semesters (Semester I and Semester II) in an academic year. Each student requires to complete this program not more than 06 (six) long consecutive academic years. The course curricula consist of the theoretical classes, laboratory sessions and project/thesis work. There are University Courses, Nazrul Studies and Bangladesh Studies which are weighted 3 (three) credits individually must be completed within Credit Courses by the students of Bachelor Degree of Science and Engineering.

The duration of each of semester will be 19 weeks that will be used as described in Table-1.

**Table-1: Duration of a semester.**

|  |  |
| --- | --- |
| Classes | 14 weeks |
| Recess before Semester Final Examination | 2 weeks |
| Semester Final Examination | 3 weeks |
| Total | 19 weeks |

**2.1. Assignment of Credits**

The assignment of credits to a theoretical course follows a different rule from that of practical courses.

1. For theoretical courses one lecture of 1 hour duration per week per semester is equivalent to one credit (14 lecture hours).
2. For practical courses one lab of 2 hour duration per week per semester is equivalent to one credit (28 lab hour sessions).
3. Credits are also assigned to project works taken by students in the 2nd, 4th, 6th, 7th and 8th semesters.

**2.2. Medium of Instruction and Answer**

The medium of instruction and answer in the examination script willl be English. For University Course, the medium of instruction could be Bengali.

**2.3. Course Coding System**

Each course is designed by a three to four letter code identifying the department offering code followed by a three-digit number having the following interpretation:

1. The last three digits represent the course number.
2. The last two zeros (00) of a course code represents Project/Thesis works.
3. Other than exceptions, the last digit is an odd number for theoretical courses and an even number for laboratory courses.
4. The letter code CSE stands for departmental courses, EEE represents Electronics/Electrical courses, PHY stands for Physics courses, MATH stands for mathematical courses, and GED identifies general educational courses.

**2.4. Grading System**

The total performance of a student in given course is based on a scheme of continuous assessment. For theory courses this continuous assessment is made through a set of quizzes, class evaluation, class participation, homework assignment and a semester final examination. The assessment in laboratory/practical courses is made through observation of the student at work during the class, viva-voce, laboratory hours and quizzes.

Each course has a certain number of credits, which describes its corresponding weights. A letter grade with a specification number of grade points is awarded to each course for which a student is registered. A student's performance is measured both by the number of credits completed satisfactorily and by the weighted average of the grade point earned. A minimum grade point average (GPA) is essential for satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree. Letter grades and corresponding grade points will be awarded in accordance with the provisions shown below:

**Table-2: Marks versus Letter Grade versus Grade Point System**

|  |  |  |  |
| --- | --- | --- | --- |
| **Numerical Grade** | **Letter**  **grade** | **Grade**  **Point** | **Interpretation** |
| 80% and above | A+ | 4.00 | Outstanding |
| 75% to less than 80% | A | 3.75 | Excellent |
| 70% to less than 75% | A- | 3.50 | Very Good |
| 65% to less than 70% | B+ | 3.25 | Good |
| 60% to less than 65% | B | 3.00 | Satisfactory |
| 55% to less than 60 | B- | 2.75 | Nearly Satisfactory |
| 50% to less than 55% | C+ | 2.50 | Average |
| 45% to less than 50% | C | 2.25 | Nearly Average |
| 40% to less than 45% | D | 2.00 | Poor |
| Less than 40% | F | 0 | Fail |

***Computation of Grade Point Average (GPA)***

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes n courses in a semester having credits of C1, C2,........................., Cn and his/her earned grade points in these courses are G1, G2.................Gn respectively, then.



The Cumulative Grade Point average (CGPA) is the weight average of the GPA obtained in all the semester passed/completed by a student. For example, if a student passes/completes n semesters having total credits of TC1, TC2, ......... TCn, and his/her GPA in these semesters are GPA1, GPA2.................GPAn respectively, Then:



***Example for Computing GPA***

Say a student completed eight courses in a semester and obtained the following grade:

|  |
| --- |
| Course Credits Grade Grade Points Ci × Gi  (Ci) (Gi) |
| CSE 111 2.00 A+ 4.00 8.000  CSE 112 3.00 A+ 4.00 12.000  CSE 113 1.50 A 3.75 5.625  CSE 114 3.00 B 3.00 9.000  CSE 115 1.50 A- 3.50 5.250  CSE 116 3.00 A+ 4.00 12.000  CSE 117 4.00 A 3.75 15.000  CSE 118 1.50 A- 3.50 5.250 |
| **Total 19.50 72.125** |

Then, the Grade point Average (GPA) is calculated as follows:

GPA= 72.125/19.50=3.7

***Example for Computing CGPA***

Say, a student completed four semesters and obtained the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Semester | Total Credit  TCi | GPA Earned,  GPAi | TCi×GPAi |
| 1 | I | 19.50 | 3.70 | 72.150 |
| 1 | II | 20.50 | 3.93 | 80.565 |
| 2 | I | 21.25 | 3.96 | 84.150 |
| 2 | II | 20.25 | 4.00 | 81.000 |
| **Total** |  | **81.50** |  | **317.865** |

Then, the Cumulative Grade Point Average (CGPA) is calculated as follows:

CGPA=317.865/81.50=3.90

**2.5. Distribution of Marks**

The distribution of marks for a given course is as follows:

***Theory Courses***

|  |  |  |
| --- | --- | --- |
|  | Continuous Assessment | 40% |
| (Class attendance: 10%; Midterms/Assignment: 30%) | | |
|  | Semester final examination (3 hours duration) | 60% |
| **Total 100%** | | |

***Courses on Laboratory***

|  |  |  |
| --- | --- | --- |
|  | Continuous Assessment | 40% |
|  | (Class attendance: 10%; Lab Report: 10%, Continuous evaluation 20%) |  |
|  | Lab Final Examination | 60% |
|  | (Viva-voce: 20%; Lab Test: 30%; Ans. Script: 10%) |  |
| **Total 100%** | | |

***Project and Thesis***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| i) | Continuous Assessment (Given by Supervisor) | | | 40% |
| ii) | Final Examination | | | 60% |
|  | Report | 10% |  | |
|  | Demonstration | 30% |  | |
|  | Presentation/Viva-voce | 20% |  | |
| **Total**  **100%** | | | | |

**2.6. Distribution of Marks in Class Participation and Attendance**

**Table-3: Percentages of Marks in Class Attendance**

|  |  |
| --- | --- |
| **Attendance** | **Percentage of Marks** |
| 90% or above | 10% |
| 85% to less than 90% | 9% |
| 80% to less than 85% | 8% |
| 75% to less than 80% | 7% |
| 70% to less than 75% | 6% |
| 65% to less than 70% | 5% |
| 60% to less than 65% | 4% |
| Less than 60% | 0% |

**3. B.Sc (Engg) Program**

**3.1. Promotion**

***From First Year to Second Year***

For promotion from 1st year to 2nd year a student will be required to earn CGPA of 2.00.

***From Second Year to Third Year***

For promotion from 2nd year to 3rd year a student will be required to earn CGPA of 2.25 (except viva-voce grade) taking into consideration all the grade points earned in a total number of courses of 1st year and 2nd year & the improved grade, if any.

***From Third Year to Fourth Year***

For promotion to 3rd year to 4th year, a student will be required to earn CGPA of 2.5 (except viva-voce grade) taking into consideration all the grade points earned in all courses of 1st, 2nd & 3rd year including the improved grade, if any.

N.B.: A student failing to clear up the university/departmental dues of the year of study shall not be promoted to the next year.

**3.2. Dean's List**

As a recognition of excellent performance, the names of students obtaining an average GPA of 3.80 or above in two regular Semester in each academic year may be published in Dean's list in each faculty. Students having GPA of 3.80 or more but received an 'F' Grade in any of the courses will not be considered for Dean's list for that year.

**3.3. Improvement of Grades**

1. Students obtaining the grade C and below (less than 2.25) in any year (1st semester to 8th semester) shall be allowed to improve the grade only with the next immediate and available batch. After the publication of grade improvement examination result if the student fails to improve his/her 'F' grade shall be given only one more opportunity to improve the 'F' grade. The examination shall be called F grade improvement examination.
2. To improve the grade and to appear in the examination the student shall have to pay the examination fee for each course as determined by the University from time to time.
3. A students willing to appear improvement Examination shall have to apply to the Controller of Examination through the Head of the Department concerned in the prescribed form within 30 days of the publications of the final result of each semester. If a student fails to improve his/her CGPA, then previous CGPA will remain valid.
4. No improvement shall be allowed in internal evaluation (attendance/in-course/assignment/tutorial/report/presentation/mid term).
5. The relevant 4th year examination committee will conduct and complete the 4th year grade-improve examination within 4 (four) months and 'F grade improvement examination' within 2 (two) months after the publication of result.

**3.4. Award of the Bachelor of Engineering Degree**

1. Bachelor of Engineering degree shall be awarded to a student on completion of minimum 160 credits and on securing CGPA of 2.5 or above.
2. A student for four years degree shall be awarded the degree with distinction if his/her CGPA is 3.80 and above and he/she does not have any F grade in the total program.

**3.5. Re-admission**

1. A student failing to get the requisite grade points for promotion from a year to the next year may seek re-admission with the following batches. For re-admission a student shall have to apply for this within one month after announcement of the result of the concerned year.
2. On re-admission, grades earlier earned by a student in the class year of re-admission shall cease to exist and the student shall have to retake all the course works and examinations again.
3. A student can take readmission in a class year shall be allowed only once and a student will not get chance for readmission more than twice during the entire program. A re-admitted student must complete the Bachelor of Science program in Engineering within a maximum period of six consecutive years from the his/her admission year.

**3.6. Drop Out**

1. A student failing to earn the yearly GPA for promotion from one year to next year taking readmission in any year shall be dropped out of the program.
2. For a student fails to earn the CGPA of 2.5 or complete 160 credits including grade improvements examination/ F grade improvement shall be dropped out from the B.Sc (Engg.) program.

**3.7. Adoption of Unfair Means**

1. Students adopting unfair means shall be treated according to university rules.
2. No credit transfer from any other program/university/institution is allowed for Bachelor of Science and Engineering.

**4. Syllabus of B.Sc (Engg) Program**

**4.1. Credit Hours**

The current syllabus of B.Sc (Engg) Degree of Computer Science and Engineering consists of a total of 165 credit hours. Percentage of credits in various fields in current syllabus is shown in Table-4. The semester-wise distribution of the courses according to the current syllabus is presented the next subsection.

**Table-4: Percentage of credits in various fields in current syllabus.**

|  |  |  |
| --- | --- | --- |
| **Field** | **Credit** | **Percentage** |
| CSE | 118.50 | 71.81 |
| EEE | 13.50 | 8.18 |
| Math | 15.00 | 9.1 |
| Physics | 3.00 | 1.81 |
| General Education | 15.00 | 9.1 |
| **Total** | **165.00** | **100.00** |

**4.2. Semester-Wise Distribution of Courses in B.Sc. (Engg.) Syllabus**

**First Year First Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 103 | Discrete Mathematics | 3.0 | - | 3.0 | CSE 103 |
| CSE 105 | Structured Programming | 3.0 | - | 3.0 |  |
| CSE 106 | Structured Programming Lab | - | 1.5 | 1.5 |  |
| EEE 161 | Basic Electrical Engineering | 3.0 | - | 3.0 |  |
| EEE 162 | Basic Electrical Engineering Lab | - | 1.5 | 1.5 |  |
| GED 163 | Accounting | 3.0 | - | 3.0 |  |
| GED 165 | English | 3.0 | - | 3.0 |  |
| MATH 167 | Calculus and Differential Equation | 3.0 | - | 3.0 |  |
|  | **Total** | **18.0** | **3.0** | **21.0** |  |

**First Year Second Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 123 | Programming with Python | 3.0 | - | 3.0 | CSE 101 |
| CSE 124 | Programming with Python Lab | - | 1.5 | 1.5 |  |
| CSE 127 | Numerical Methods | 3.0 | - | 3.0 |  |
| MATH 171 | Matrix and Vector Analysis | 3.0 | - | 3.0 |  |
| EEE 175 | Electronics | 3.0 | - | 3.0 |  |
| EEE 176 | Electronics Lab | - | 1.5 | 1.5 |  |
| PHY 177 | Physics | 3.0 | - | 3.0 |  |
| GED 179 | Nazrul Studies | 3.0 | - | 3.0 |  |
| CSE 100 | Software Development Project with C/Python | - | 1.5 | 1.5 |  |
|  | **Total** | **18.0** | **4.5** | **22.5** |  |

**Second Year First Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 201 | Object Oriented Programming | 3.0 | - | 3.0 | CSE 121 |
| CSE 202 | Object Oriented Programming Lab | - | 1.5 | 1.5 |  |
| CSE 203 | Data Structures | 3.0 | - | 3.0 | CSE 121 |
| CSE 204 | Data Structures Lab | - | 1.5 | 1.5 |  |
| CSE 205 | Digital Logic Design | 3.0 | - | 3.0 | EEE 161 |
| CSE 206 | Digital Logic Design Lab | - | 1.5 | 1.5 |  |
| MATH 261 | Coordinate Geometry | 3.0 | - | 3.0 |  |
| GED 263 | Bangladesh Studies | 3.0 | - | 3.0 |  |
| MATH 273 | Statistics and Probability Theory | 3.0 | - | 3.0 |  |
|  | **Total** | **18.0** | **4.5** | **22.5** |  |

Second **Year Second Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 221 | Algorithms | 3.0 | - | 3.0 | CSE 103, CSE 203 |
| CSE 222 | Algorithms Lab | - | 1.5 | 1.5 |  |
| CSE 223 | Database Management System | 3.0 | - | 3.0 |  |
| CSE 224 | Database Management System Lab | - | 1.5 | 1.5 |  |
| CSE 225 | Computer Architecture and Organization | 3.0 | - | 3.0 |  |
| CSE 229 | Engineering Ethics and Cyber Law | 3.0 | - | 3.0 | EEE 175 |
| CSE 231 | Programming With C++ | - | 1.5 | 1.5 |  |
| MATH 275 | Complex variable, Laplace transformation and Fourier Analysis | 3.0 | - | 3.0 |  |
| CSE 200 | Software Development Project with C++/Java | - | 1.5 | 1.5 |  |
|  | **Total** | **15.0** | **6.0** | **21.0** |  |

**Third Year First Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 301 | Microprocessors | 3.0 | - | 3.0 | CSE 205 |
| CSE 302 | Microprocessors and Assembly Language Lab | - | 1.5 | 1.5 |  |
| CSE 303 | Operating Systems | 3.0 | - | 3.0 |  |
| CSE 304 | Operating Systems Lab | - | 1.5 | 1.5 |  |
| CSE 305 | Theory of Computation | 3.0 | - | 3.0 |  |
| CSE 307 | Internet and Web Programming | 3.0 | - | 3.0 |  |
| CSE 308 | Internet and Web Programming Lab | - | 1.5 | 1.5 |  |
| CSE 309 | Data Communication | 3.0 | - | 3.0 |  |
|  | **Total** | **15.0** | **4.5** | **19.5** |  |

**Third Year Second Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 321 | Computer Networks | 3.0 | - | 3.0 |  |
| CSE 322 | Computer Networks Lab | - | 1.5 | 1.5 |  |
| CSE 323 | Compiler Design | 3.0 | - | 3.0 | CSE 305 |
| CSE 324 | Compiler Design Lab | - | 1.5 | 1.5 |  |
| CSE 325 | Computer Peripherals and Interfacing | 3.0 | - | 3.0 |  |
| CSE 326 | Computer Peripherals and Interfacing Lab | - | 1.5 | 1.5 |  |
| CSE 327 | System Analysis and Design | 3.0 | - | 3.0 |  |
| GED 371 | Economics | 3.0 | - | 1.5 |  |
| CSE 300 | Software Development Project | - | 1.5 | 1.5 |  |
|  | **Total** | **15.0** | **6.0** | **21.0** |  |

**Fourth Year First Semester**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 401 | Software Engineering | 3.0 | - | 3.0 |  |
| CSE 405 | Artificial Intelligence | 3.0 | - | 3.0 |  |
| CSE 406 | Artificial Intelligence Lab | - | 1.5 | 1.5 |  |
| CSE 411 | Data Science | 3.0 | - | 3.0 | CSE 309 |
| CSE 409 | Digital Signal Processing | 3.0 | - | 3.0 |  |
| CSE 410 | Digital Signal Processing Lab | - | 1.5 | 1.5 |  |
| CSE 435 | Network Security | 3.0 | - | 3.0 | CSE 321 |
| CSE 436 | Network Security Lab | - | 1.5 | 1.5 |  |
| CSE400(A) | Thesis / Project | - | 1.5 | 1.5 |  |
|  | **Total** | **15.0** | **6.0** | **21.0** |  |

**Fourth Year Second Semester**

(In this Semester, the students are to undertake 1 (One) optional course from **Optional**)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 425 | Machine Learning | 3.0 | - | 3.0 |  |
| CSE 426 | Machine Learning Lab | - | 1.5 | 1.5 |  |
| CSE 427 | Computer Graphics | 3.0 | - | 3.0 | MATH 171, MATH 275 |
| CSE 428 | Computer Graphics Lab | - | 1.5 | 1.5 |  |
|  | Optional | 3.0 | 1.5 | 4.5 |  |
| CSE400(B) | Thesis / Project | - | 3.0 | 3.0 |  |
|  | **Total** | **9.0** | **7.5** | **16.5** |  |

**Optional** (The students are to undertake 1 (One) optional course from the followings)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Number** | **Course Title** | **Hours/Week** | | **Credit** | **Pre-requisite** |
| **Theory** | **Sessional** |
| CSE 431 | Digital Speech Processing | 3.0 | - | 3.0 | MATH 273 |
| CSE 432 | Digital Speech Processing Lab | - | 1.5 | 1.5 |  |
| CSE 433 | Robotics Technology | 3.0 | - | 3.0 | CSE 205, CSE 227 |
| CSE 434 | Robotics Technology Lab | - | 1.5 | 1.5 |  |
| CSE 437 | Parallel and Distributed Processing | 3.0 | - | 3.0 | CSE 301 |
| CSE 438 | Parallel and Distributed Processing Lab | 1.5 | - | 1.5 |  |
| CSE 439 | Digital Image Processing | 3.0 | - | 3.0 | MATH 273 |
| CSE 440 | Digital Image Processing Lab | - | 1.5 | 1.5 |  |
| CSE 443 | Natural Language Processing | 3.0 | - | 3.0 | MATH 273 |
| CSE 444 | Natural Language Processing Lab | - | 1.5 | 1.5 |  |
| CSE 445 | Basic Graph Theory | 3.0 | - | 3.0 | CSE 203, CSE 221 |
| CSE 446 | Basic Graph Theory Lab | - | 1.5 | 1.5 | MATH 273 |
| CSE 451 | VLSI Design | 3.0 | - | 3.0 | EEE 175 |
| CSE 452 | VLSI Design lab | - | 1.5 | 1.5 |  |
| CSE 453 | Pattern Recognition | 3.0 | - | 3.0 | MATH 273 |
| CSE 454 | Pattern Recognition lab | - | 1.5 | 1.5 |  |
| CSE 457 | Multimedia Technology | 3.0 | - | 3.0 |  |
| CSE 458 | Multimedia Technology lab | - | 1.5 | 1.5 |  |
| CSE 459 | Wireless Communication | 3.0 | - | 3.0 | CSE 321 |
| CSE 460 | Wireless Communication Lab | - | 1.5 | 1.5 |  |

**Summary**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year - Semester** | **Hours/Week** | | **Credit** | **Number of Theory Courses** | **Number of Lab Courses /Project** |
| **Theory** | **Sessional** |
| 1—I | 18.0 | 3.0 | 21.0 | 6 | 2 |
| 1—II | 18.0 | 4.5 | 22.5 | 6 | 3 |
| 2—I | 18.0 | 4.5 | 22.5 | 6 | 3 |
| 2—II | 15.0 | 6.0 | 21.0 | 5 | 4 |
| 3—I | 15.0 | 4.5 | 19.5 | 5 | 3 |
| 3—II | 15.0 | 6.0 | 21.0 | 5 | 4 |
| 4—I | 15.0 | 6.0 | 21.0 | 5 | 4 |
| 4—II | 9.0 | 7.5 | 16.5 | 3 | 4 |
| **Total** | **123.0** | **42.0** | **165.0** | **41** | **27** |

**4.3. Details Course Outline according to B.Sc. (Engg.) Syllabus**

**First Year First Semester**

**Course Code : CSE 103 Credit hour: 3.0**

**Course Title : Discrete Mathematics**

***Course Outline:***

Sets: Introduction, Sets and elements, Universal and empty sets, Subsets, Venn diagrams, Operations on sets, Algebra of sets, Finite sets and Counting principle, , Power set and Partitions.

Relations: Introduction, Composition of relation, Types of relations, Closure properties, Equivalence relation, Partial ordering relations, n-ary relation.

Functions: One-to-one, onto and invertible functions, Composition of function, Recursive functions, Cardinality.

Logic and Propositions: Propositions, compound propositions, Truth tables, Basic logical operations, Tautologies and contradictions, Logical equivalence, Algebra of Propositions.

Sets with binary operations: Binary operations, Semigroups, Monoids, Groups, Subgroups, Homomorphisms, Congruence relations, Cycle and Rings.

Counting: Basic counting principle; Factorial, Permutations, and Combinations; Pigeonhole principle, Generating function, Binomial coefficients and theorem.

Graphs: Introduction, Multigraph, Connectivity, Planar graph, Graph colorings and Representing graphs in memory.

Tree: Introduction, Binary trees, Completed and extended binary trees, Traversing, Binary search trees and Representing binary trees in memory.

***Objectives:***

After undergoing this course, students should be able to:

a) to know about different types of sets and set theory.

b) to know about relations and functions.

c) to know about the logic and propositions.

d) to know about the counting theory.

e) to know about the graph theory and tree theory.

***Assessment:***

Midterm/Assignments/Presentation : : 30%

Attendance : 10 %

Semester Final : 60%

***Text and Reference Books:***

(a) “Discrete Mathematics and its Applications” by Kenneth H Rosen

(b) “Discrete Mathematics (Schaum’s Outlines)” by Seymour Lipschutz and Marc Laras Lipson

(c) “Discrete Mathematics” by Norman L Biggs

***Weekly Schedule:***

|  |  |
| --- | --- |
| **Week** | **Topics** |
| Week-1 | Discuss about discrete mathematics and its applications and importance and also sets theory. |
| Week-2 | Discuss about relations and its classifications. |
| Week-3 | Discuss about functions and its classifications. |
| Week-4 | Discuss about different types of logic. |
| Week-5 | Review of previous class and take Mid-term 1. |
| Week-6 | Discuss about different types of propositional statements. |
| Week-7 | Discuss about sets with binary operations |
| Week-8 | Discuss about counting principle. |
| Week-9 | Practice exercise of counting principle. |
| Week-10 | Review of previous class and take Mid -term 2. |
| Week-11 | Discuss about tree theory. |
| Week-12 | Discuss about graph theory. |
| Week-13 | Practice exercise of graph and tree thory. |
| Week-14 | Presentation on different topics related to this course. |

**Course Code : CSE 105 Credit hour: 3.0**

**Course Title : Structured Programming**

***Course Outline:***

**Introduction:** Procedural and non-procedural Programming Languages, Structured Language, Problem solving techniques, algorithm specification and development. Programming style, Debugging, Program documentation. Program design methodologies, Structured and modular program design.

**Introduction to C Programming:** C programming environment, simple C programs, variables, arithmetic in C, and operators in C.

**Structured Programming Approach:** Algorithm, pseudo code, control structures: (sequential, selection, repetition), if selection, if-else selection, while repetition, counter controlled repetitions, assignment, increment/decrement operators.

**Program Control:** Essentials of repetitions (loop); for, while and do-while loops; switch multiple selection structure, break and continue statements.

**Functions:** Program modules in C, user-defined and library functions, header files, parameter passing, storage classes, scope rules, recursion.

**Arrays and Pointers:** Array: declaring arrays, types of arrays with examples, passing arrays to functions, sorting and searching arrays; Pointers: pointer arithmetic, pointers and functions, pointers and arrays, pointers to pointers.

**Structures and Unions:** Basics of structures, initialization, structures and functions, structures and arrays, pointers to structures, structures within structures and unions.

**Dynamic Memory Management:** Malloc, Calloc, Free, and sizeof functions.

**File Management:** Low Level and high level file access. Sequential and random access files, error handling.

**Preprocessor:** macro substitution, header file inclusion, study of standard libraries like studio. H, ctype.h, string.h, math.h, stdlib.h, dos.h

***Objectives:***

After undergoing this course, students should be able to:

a) Analyze a problem to develop an algorithm to solve it.

b) Understand modular programming approach

c) Design, execute and debug a C program

d) Use function, array and pointer efficiently.

e) Handle files and dynamic memory more efficiently.

***Assessment:***

Midterm/Assignments/Presentation : 30%

Attendance : 10 %

Semester Final : 60%

***Text and Reference Books:***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Kernighan and Ritchie | : | The C Programming Language |
|  | Gotfreid | : | Programming with C, Schaum's Outline Series, TMH |
|  | M. Keller | : | A first Course on Computer Programming using Pascal, McGraw-hill, 1987 |
|  | D.E. Knuth | : | The Art of Computer Programming |
|  | H. Schieldt | : | The complete reference, Turbo C/C++ |
|  | E. Balagurusamy | : | Programming with ANSI C |
|  | H. Schieldt | : | Teach yourself C |
|  | H. Schieldt | : | Teach yourself C++ |
|  | N. Barkakati | : | Object Oriented Programming with C++ |

***Weekly Schedule:***

|  |  |
| --- | --- |
| **Week** | **Topics** |
| Week-1 | Introduction to C programming environment, simple C programs |
| Week-2 | Implementation of variables, arithmetic in C, and operators in C. |
| Week-3 | Debugging, Program documentation, modular program design |
| Week-4 | Implementation of if selection, if-else selection, while repetition, counter controlled repetitions, assignment, increment/decrement operators. |
| Week-5 | Implementation of for, while and do-while loops; switch multiple selection structure, break and continue statements. |
| Week-6 | Program modules in C, user-defined and library functions, header files, parameter passing, storage classes, scope rules, recursion. |
| Week-7 | Implementation of Array: declaring arrays, types of arrays with examples, |
| Week-8 | Passing arrays to functions, sorting and searching arrays; |
| Week-9 | Implementation of Pointers: pointer arithmetic, pointers and functions, pointers and arrays, pointers to pointers. |
| Week-10 | Basics of structures, initialization, structures and functions, |
| Week-11 | Structures and arrays, pointers to structures, structures within structures and unions. |
| Week-12 | Implementation of Dynamic Memory Management with malloc, calloc, free, and sizeof functions. |
| Week-13 | Implementation of Low Level and high level file access. Sequential and random access files, error handling. |
| Week-14 | Implementation of macro substitution, header file inclusion, study of standard libraries like studio. H, ctype.h, string.h, math.h, stdlib.h, dos.h |

**Course Code : CSE 106 Credit hour: 1.5**

**Course Title : Structured Programming Lab**

**Course Outlines:**

Laboratory works based on Course CSE 105

**Objectives:**

After undergoing this course, students should be able to:

a) Understand the basic structure of a Computer system.

b) Use Operating system efficiently.

c) Understand the basics of Networking.

d) Understand the basics of C programming language.

**Assessment:**

Lab Report : 10%

Attendance : 10%

Continuous Evaluation : 20%

Lab Final : 60%

**Text and Reference Books:**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Warford | : | Computer Science |
| 2. | L. Rosch | : | Hardware Bible, Braddy Publishing, Indianapolis |
| 3. | P. Norton | : | Inside the PC |
| 4. | Subramanian | : | Introduction to Computers |
| 5. | P. Norton | : | Introduction to Computer |
| 6. | V. K. Jain | : | Switching theory and Digital Electronics |

**Weekly Schedule:**

|  |  |
| --- | --- |
| **Week** | **Topics** |
| Week-1 | Introduction to CPU, Memory units**,** I/O Devices, peripheral devices |
| Week-2 | Introduction to BIOS, Bus Architecture, Storage devices. |
| Week-3 | Introduction to Windows and UNIX operating systems |
| Week-4 | Introduction to Application software like word-word processing, spreadsheet database and presentation software. |
| Week-5 | Introduction to LAN Card, media, wifi etc. |
| Week-6 | Introduction to Internet Services, on-Line and off-line Processing, E-mail, and WWW. |
| Week-7 | Implementation of Software and hardware troubleshooting and maintenance. |
| Week-8 | Introduction to C program structure |
| Week-9 | Introduction to Compiler and Interpreter |
| Week-10 | Introduction to programming language C |
| Week-11 | Implementing C program |
| Week-12 | Do |
| Week-13 | Do |
| Week-14 | Introduction to antivirus program and virus protection |

|  |  |
| --- | --- |
| **Course Code** | **: EEE -161 Credit hour: 3.0** |
| **Course Title** | **: Basic Electrical Engineering** |
|  |  |
| ***Course Outline:***  Fundamental electrical concepts and measuring units; Direct current: voltage, current, resistance and power; Laws of electrical circuits and methods of network analysis; Introduction to magnetic circuits; D.C. Transients; Alternating current: instantaneous and r.m.s current, voltage and power, average power for various combinations of R, L and C circuits, phasor representation of sinusoidal quantities. | |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Course Objectives:*** | | | |
| At the end of the course students will be able to | | | |
| a) | Define and describe basic properties of electrical circuits components | | |
| b) | Explain and apply knowledge to construct basic circuits. | | |
| c) | Achieved knowledge regarding the various laws and principles associated with electrical systems. | | |
| d) | Classify and compare different electrical circuits. | | |
| e) | To understand the basic concepts of magnetic, AC & DC circuits | | |
| f) | Evaluate electrical components, circuits and performance factors for different application. | | |
| ***Assessment:***  Midterm/Assignments/Presentation : : 30%  Attendance : 10 %  Semester Final : 60% | | |  |
| ***Recommended Textbooks:*** | | | |
| 01. | | Robert L. Boylestad, Introductory Circuit Analysis. | |
| 02. | | B.L., Theraja, Electrical Technology, Vol. I. | |
|  | | | |
| ***Reference Books:*** | | | |
| 01. | | Charles Alexander and Matthew Sadiku, Fundamental of Electric Circuits. | |
| 02. | | Metha.V.K, Rohit Metha, Basic Electrical Engineering. | |
| 03. | | Bhattacharya.S.K, Basic Electrical and Electronics Engineering. | |
| 04. | | Richard C. Drof, Electrical Circuits. | |

**Weekly Schedule:**

|  |  |
| --- | --- |
| **Weeks** | **Topics** |
| Week-1 | Fundamental electrical concepts and measuring units; Direct current: voltage, current, resistance and power. |
| Week-2 | Analysis of Resistive Circuits and Solution of resistive circuits with independent sources. |
| Week-3 | Series dc circuits and parallel dc circuits, series-parallel circuits. |
| Week-4 | Current sources, source conversions, branch-current analysis, mesh analysis and nodal analysis, bridge networks, Y- Δ (T-π) and Δ-Y (π-T) conversions. |
| Week-5 | Laws of electrical circuits and methods of network analysis, Superposition theorem, Thévenin’s theorem, Norton’s theorem |
| Week-6 | Maximum power transfer theorem, Millman’s theorem, Substitution theorem reciprocity theorem. |
| Week-7 | Design low pass, high pass, band pass and band elimination filter networks. |
| Week-8 | Introduction to magnetic circuits; Magnetic Field, Reluctance, Ohm’s Law for Magnetic Circuits, Magnetizing Force, Hysteresis, Ampère’s Circuital Law, Flux, D.C. Transients; |
| Week-9 | Sinusoidal Alternating Waveforms**:** Sinusoidal ac voltage characteristics and definitions, frequency Spectrum, the sinusoidal waveform, general format for the sinusoidal voltage or current, phase relations, average value. |
| Week-10 | Alternating current: instantaneous and effective (rms) values, response of basic *R, L,* and *C* elements to a sinusoidal voltage or current, frequency response of the basic elements, average power and power factor. |
| Week-11 | Complex numbers, rectangular form, polar form, conversion between forms, mathematical operations with complex numbers, phasors, impedance and the phasor diagram, admittance and susceptance. |
| Week-12 | Measure power and power factor in ac circuits, series resonant circuit, the quality factor (*Q*), selectivity, transformers: mutual inductance, the iron-core transformer, air-core transformer, types of transformers |
| Week-13 | Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits |
| Week-14 | Average power for various combinations of R, L and C circuits, phasor representation of sinusoidal quantities. |

|  |  |
| --- | --- |
| **Course Code** | **: EEE -162 Credit hour: 1.5** |
| **Course Title** | **: Basic Electrical Engineering Lab** |
|  |  |
| ***Course Outline:*** | Laboratory works based on Course EEE 161 |

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| --- | --- |
| ***Course Objectives:*** | |
| The objective of this course is to | |
| a) | Acquire knowledge about electrical components, measuring instruments, bread board assembling, etc. |
| b) | Introduce the basic electrical components such as capacitors, inductors and electrical devices. |
| c) | Demonstrate and understand different electrical circuits components. |
| d) | Analysis, design and solve different electrical circuits. |
| e) | Implement different circuit network theorem for DC and AC. |
| f) | Provide students with a thorough understanding of the electrical properties and  characteristics of various materials, used in the electrical appliances , devices , instruments. |

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| **Assessment:**  Lab Report : 10%  Attendance : 10%  Continuous Evaluation : 20%  Lab Final : 60% | |  |
| ***Recommended Textbooks:*** | | |
| 01. | Robert L. Boylestad, Introductory Circuit Analysis. | |
| 02. | B.L., Theraja, Electrical Technology, Vol. I. | |
|  | | |
| ***Reference Books:*** | | |
| 01. | Charles Alexander and Matthew Sadiku, Fundamental of Electric Circuits. | |
| 02. | Metha.V.K, Rohit Metha, Basic Electrical Engineering. | |
| 03. | Bhattacharya.S.K, Basic Electrical and Electronics Engineering. | |
| 04. | Richard C. Drof, Electrical Circuits. | |

***Weekly Schedule:***

|  |  |
| --- | --- |
| **Weeks** | **Topics** |
| Week-1 | Identify of various electrical components. |
| Week-2 | Design and implement circuit connection. |
| Week-3 | To verify Ohm’s law. |
| Week-4 | Analysis of resistive circuits and solution of resistive circuits with independent sources. |
| Week-5 | To analysis a series-parallel network. |
| Week-6 | To verify Voltage Divider Rule (VDR) and Current Divider Rule (CDR). |
| Week-7 | To verify Kirchhoff’s Voltage Law (KVL) and Kirchhoff’s Current Law (KCL). |
| Week-8 | To verify and analysis Thevenin’s theorem. |
| Week-9 | To verify and analysis Norton’s theorem. |
| Week-10 | To verify and analysis maximum power transfer theorem. |
| Week-11 | To verify and analysis Superposition theorem. |
| Week-12 | To verify the frequency response of RL circuit. |
| Week-13 | To verify the frequency response of RC circuit. |
| Week-14 | To verify the frequency response of RLC circuit. |

**Course Code : GED 163 Credit hour: 3.0**

**Course Title : Accounting**

***Outlines:***

The accounting profession, accounting concept, introduction to book keeping, rules of double entry, preparing balance sheets and profit and loss statement, balance-day adjustments, closing accounts, computerized accounting systems, accounting for companies, analysis of financial reports, product costing, cost planning and control, time value of money.

|  |  |
| --- | --- |
| ***Course Objectives:***  The purpose of this course is to develop basic knowledge in Accounting based on principles, and standards followed in our business enterprises. Latest accounting issues will also be highlighted for professional knowledge where the executives will have the scope to bridge up the gaps between accounting theories & principles based on global accounting knowledge. | |
|  | | |
| ***Assessment:***  Midterm/Assignments/Presentation : 30%  Attendance : 10 %  Semester Final : 60% | | |
| ***Recommended Textbooks:*** | | |
| **01.** | Weygandt, Kieso, Kimmel : **Accounting Principles** | |
|  | | |
| ***Reference Books:*** | | |
| **01.** | Roger H, Harmenson H : **Accounting principles** | |

|  |  |
| --- | --- |
| ***Weekly Schedule:*** | |
| **Weeks** | **Topics** |
| Week-1 | Introduction to Principles of Accounting, Definition of “Accounting.”, Identify the activities and users associated with accounting. Explain the building blocks of accounting: ethics, principles, and assumptions. State the accounting equation, and define its components. Analyze the effects of business transactions on the accounting equation. Understand the four Financial Statements and how they are prepared. |
| Week-2 | Describe how accounts, debits, and credits are used to record business transactions. Indicate how a journal is used in the recording process. Explain how a ledger and posting help in the recording process. Prepare a trial balance. |
| Week-3 | Explain the accrual basis of accounting and the reasons for adjusting entries. Different types of Adjusting the Accounts Prepare adjusting entries for deferrals. |
| Week-4 | Prepare adjusting entries for accruals. Describe the nature and purpose of an adjusted trial balance. Preparing the Adjusted Trial Balance. |
| Week-5 | Prepare worksheet, Preparing the Financial Statement from work-sheet, Preparing Closing Entries, Posting Closing Entries, Preparing a Post-Closing Trial Balance |
| Week-6 | Difference between Service and Merchandising Companies  Recording Purchase of Merchandise :   * Freight Costs * Purchase Returns and Allowances * Purchase Discounts * Summary of Purchasing Transactions   Recording Sales of Merchandise  Forms of Financial Statements  Classified Balance Sheet |
| Week-7 | Inventory Costing under FIFO, LIFO and weighted average method:   * Periodic System   Inventory Costing under FIFO, LIFO and weighted average method:   * Perpetual System   Cost Flow Assumptions |
| Week-8 | Explain the basic concepts of an accounting information system. • Computerized accounting systems  • Manual accounting systems  Describe the nature and purpose of a subsidiary ledger.  • Subsidiary ledger example  • Advantages of subsidiary ledgers  Record transactions in special journals. • Sales journal  • Cash receipts journal  • Purchases journal  • Cash payments journal  • Effects of special journals  • Cyber security |
| Week-9 | Define fraud and the principles of internal control, Apply internal control principles to cash, Identify the control features of a bank account, and Explain the reporting of cash. |
| Week-10 | Types of Receivables  Recognizing Account Receivables  Valuing Account Receivable  Bad debt recording under direct write off method and allowance method |
| Week-11 | Determining the Cost of Plant Assets  Concept of Depreciation  Factors in Computing Depreciation  Depreciations Methods :   * Straight Line * Units of Activity * Declining Balance   Sale of Assets :   * Gain On Disposal * Loss On Disposal |
| Week-12 | Identify the features of managerial accounting and the functions of management. Describe the classes of manufacturing costs and the differences between product and period costs. |
| Week-13 | Demonstrate how to compute cost of goods manufactured and prepare financial statements for a manufacturer. Discuss trends in managerial accounting. |
| Week-14 | Time Preference of money, Future value, Present value, Annuity, Multi-period compounding, Yield or IRR calculation. |

**Course Code : GED 165 Credit hour: 3.0**

**Course Title : English**

***Outlines:***

English phonetics: The places of articulation and the manners of articulation of the English Sounds.

English grammar: Rules of Syntax: Grammatical principles and structures, construction of Sentences, Right form of verbs.

Developing Vocabulary: Correction of Sentences, Transformation of Sentences, Phrases and Idioms, Prefixes and Suffixes, Changing words into different forms. Synonym and Antonym, Preposition, Framing Questions.

Writing Skill: Comprehension, Paragraph writing, Precis writing, Amplification, Memo and Report writing, Letter writing.

Grammar: Tense, Right forms of verb, Sentence Structure, Transformation of sentences, Use of Preposition, Articles and Determiners, Degree.   
Reading skill: Reading Comprehension  
Writing Skill: Writing Paragraph and Essays, Writing Business Letters, (CV, Application etc.) Agendas, Meeting minutes and other business correspondents.   
Listening and Speaking skill: Formal, semiformal and informal ways of expression. How to introduce oneself and talking about a given topic.

|  |
| --- |
| ***Course Objectives:*** |
|  | |
| ***Assessment:***  Midterm/Assignments/Presentation : 30%  Attendance : 10 %  Semester Final : 60% | |
| ***Text and Reference Books:*** | |

|  |  |
| --- | --- |
| ***Weekly Schedule:*** | |
| Week | Topics |
| Week 1 | Tense |
| Week 2 | Using right forms of verbs |
| Week 3 | Transformation of sentences. Simple-compound-complex, Assertive-interrogative-imperative-optative-exclamatory, Positive-comparative-superlative |
| Week 4 | Use of preposition |
| Week 5 | Use of articles and determiners |
| Week 6 | Reading comprehension. Rules of effective reading |
| Week 7 | Writing paragraph. Main parts of paragraph, Types of paragraphs, Topic sentence |
| Week 8 | Essay writing. How to write effective thesis statement |
| Week 9 | Application and CV writing. Learning different types of application, Cover letter and other business letters |
| Week 10 | Report writing |
| Week 11 | Précis, Agenda, Meeting Minutes |
| Week 12 | Speaking practice. How to improve public speaking |
| Week 13 | Rules of English pronunciation |
| Week 14 | Effective listening |

**Course Code : MATH 167 Credit hour: 3.0**

**Course Title : Calculus and Differential Equations**

***Outlines:***

Differential Calculus: Limits, continuity, and differentiation of real-valued functions. Successive differentiation. Expansion of functions. Maxima and Minima. Partial differentiation. Tangent and Normal.

Integral Calculus: Methods of substitution. Integration by parts. Integration of special trigonometric and rational functions. Fundamental Theorem of Calculus. General properties of definite integrals. Simple definite integrals and reduction formula. Beta & Gamma Function. Length and areas of plane curves. Volumes and surface-areas of solids of revolution.

Ordinary Differential Equation: Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant coefficients, Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent or independent variables are absent. Solution of differential equation by the method based on the factorization of the operators.

***Objectives:***

After undergoing this course, students should be able to:

1. understand the general concept of function and its applications to real-world situations.
2. learn the concepts of the derivative and its underlying concepts such as limits and continuity.
3. learn to calculate derivative for various type of functions using definition and rules.
4. apply the concept of derivative to completely analyze graph of a function.
5. learn about various applications of the derivative in applied problems.
6. learn about anti-derivative and the Fundamental Theorem of calculus and its applications.
7. learn to evaluate geometric area and solve other applied problems.
8. understand fundamental concepts of differential equations.
9. perform for finding solutions of differential equations.

***Assessment:***

Midterm/Assignments/Presentation : 30%

Attendance : 10 %

Semester Final : 60%

***Text and Reference Books:***

1. Differential Calculus by B. C. Das and B. N. Mukherjee.
2. Integral Calculus by B. C. Das and B. N. Mukherjee.
3. Theory and Problems of Differential and Integral Calculus by [Frank Ayres](https://www.goodreads.com/author/show/5450643.Frank_Ayres_Jr_).
4. Integral Calculus by M. L. Khanna.
5. Differential Equations by B.D. Sharma.
6. Differential Equations by Shepley L. Ross.
7. Advanced Engineering Mathematics by H.K. Dass.

***Weekly Schedule:***

|  |  |
| --- | --- |
| **Week** | **Topics** |
| Week-1 | Introduction to Limits and continuity. |
| Week-2 | Differentiation of real-valued functions. |
| Week-3 | Successive differentiation. Expansion of functions. |
| Week-4 | Do and Mid Term I. |
| Week-5 | Maxima and Minima. Partial differentiation. |
| Week-6 | Tangent and Normal. |
| Week-7 | Various kind of Integration. |
| Week-8 | Fundamental Theorem Calculus and Mid Term II. |
| Week-9 | Properties of definite integrals, reduction formula and Beta & Gamma Function. |
| Week-10 | Length and areas of plane curves. Volumes and surface-areas of solids of revolution. |
| Week-11 | Introduction to differential equations and formation of differential equations. |
| Week-12 | First order differential equations . |
| Week-13 | Linear equations of second and higher orders. |
| Week-14 | Do and Mid Term III. |