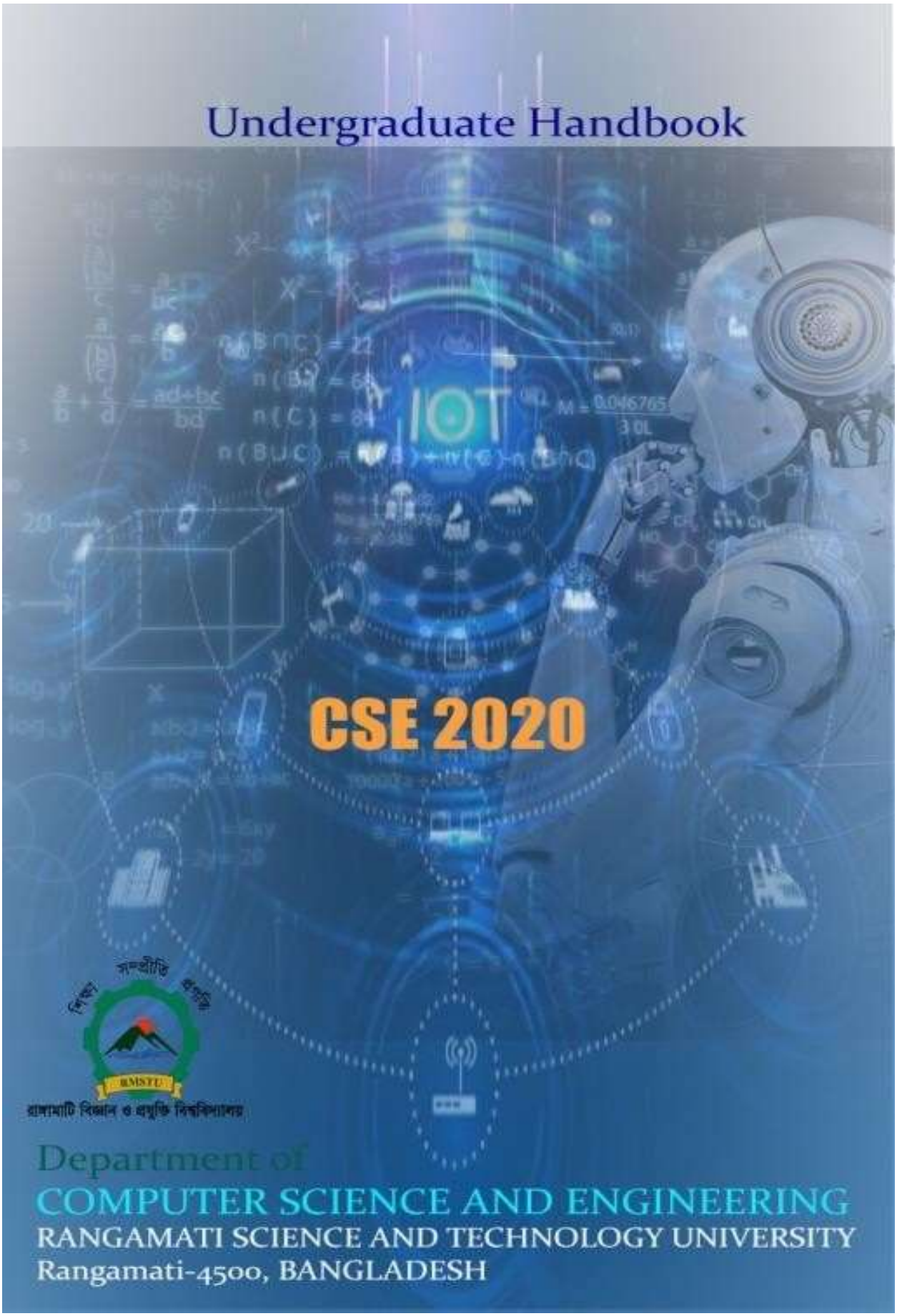
Undergraduate Handbook
IOT
CSE 2020
রাঙ্গামাটি বিজ্ঞান ও প্রযুক্তি বিশ্ববিদ্যালয়
Department of
COMPUTER SCIENCE AND ENGINEERING
RANGAMATI SCIENCE AND TECHNOLOGY UNIVERSITY
Rangamati-4500, BANGLADESH

Effective From Session 2018-2019

Undergraduate Handbook

Rules, Regulations and Syllabuses for the Degree of

B.Sc. Engineering (CSE)

----------*Department of*----------

Computer Science & Engineering (CSE)

Rangamati Science and Technology University (RMSTU)

Jhagrabil, Rangamati-4500

Published by
Department of Computer Science & Engineering
Rangamati Science and Technology University (RMSTU)
Jhagrabil, Rangamati-4500

May 2020

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Preface

Rangamati Science and Technology University (RMSTU) offers undergraduate programs. This calendar is for the undergraduate students in the Department of Computer Science and Engineering (CSE) of RMSTU. Although this calendar has been written mainly for the students, student advisers and teachers will find it valuable as a reference document. Also, anybody from any organization who wants to communicate for any kind of service including advisory service will find this book helpful. This booklet provides general information about this university, its rich historical background, university administration, faculties and departments. Different aspects of the course system, such as rules and regulations relating to admission, grading system, performance evaluation, requirement for degrees have also been elaborated. It describes the course requirements, detailed course outline and courses offered in different terms.

The fields of Computer Science and Computer Engineering themselves are changing rapidly. So the departmental as well as the non-departmental courses for CSE students have been revised to cater to recent advancements in these fields. Some courses have been reorganized to accommodate better student needs. Moreover, students now have more freedom in subject selection to specialize in a certain direction in their final years. The revised curriculum as incorporated in this calendar was approved by the academic council, RMSTU for the CSE undergraduate students from the 2018-2019 session. Some of the information recorded in this calendar is likely to be modified from time to time. Everybody concerned is strongly advised to be in touch with the advisers or the undersigned regarding modifications to be introduced later by the university. It is hoped that this information booklet will be of much use to everybody concerned.

Rangamati, Bangladesh
September, 2019

Mr. Rana Jyoti Chakma
Associate Professor and Head
Department of CSE,RMSTU

GENERAL INFORMATION

Rangamati Science and Technology University (RMSTU) is the first public university in Chittagong Hill Tracts (CHTs) region with a vision to provide quality scientific and technical education, coherence harmony and inspiring achievement.

The university was established in Rangamati by an Act „Rangamati Science and Technology University" promulgated on July 15, 2001. Immediately after promulgation of the act, preliminary activities under a project were started. But the university could not come into being as activities of the project were shifted to other district due to political decision. After assuming power in 2008 the present Awami government again initiated to establish the university under the same act.

In line with this decision the "Rangamati Science and Technology University Establishment Project" was approved at the Executive Committee of the National Economic Council (ECNEC) on February 19, 2013. The Honorable Prime Minister Sheikh Hasina formally inaugurated the university on February 23, 2013 with a view to expanding modern scientific and technical education in the CHTs as well as to cater the demand of the country. The Honorable Prime Minister put forward a line of directives and guidelines to follow in upgrading the physical infrastructure of the university. Directives include construction of buildings preserving the natural environment and ecology keeping the hills undamaged and the architectural design should be framed as per Bhutan"s architectural sculpt.

As per the provision of the act the university will be established at Jhagrabil mouza of Rangamati sadar upazila located to 8-9 kilometers south of Rangamati township. The district administration at first stage, acquired 63.725 acres of specified 100 acres of land at Jhagrabil mouza and Deputy Commissioner Md. Manzarul Mannan handed over the land to Vice Chancellor Professor Dr. Pradanendu Bikash Chakma in the presence of Professor Abdul Mannan, Chairman of Bangladesh University Grants Commission on November 4, 2017. Currently the temporary administrative building is located at complex of Chittagong Hill Tracts Development Board, Vedvedi, Rangamati. Academic activities are being carried out in premises of two local educational institutions on hire basis. The academic activities of RMSTU from 2014-2015 sessions began on November 9, 2015.

A digital survey of land was conducted through the Public Works department to help formulate the master plan of the university. In order to meet the urgent need of classrooms facility, temporary campus is under construction at Jhagrabil. It includes academic, library, administrative building as well as canteen facility. It is expected to complete by September 2019.

Currently, a total of 231 students in Management department and 222 students in Computer Science and Engineering department of five batches are enrolled in RMSTU.

A total of 15 faculty members, 20 officials and 35 employees are working at RMSTU now. Moreover 12 staffs are also working on daily basis payment and outsourcing system.



The University at a Glance

RMSTU at a Glance			
Chancellor		Vice- Chancellor	
Mr. MD. Abdul Hamid Hon‟ble President of the People‟s Republic of Bangladesh		**Prof. Pradanendu Bikash Chakma**	
Established :	**July 15, 2001**		
Location :	Jhagrabil mouza of Rangamati sadar upazila located to 8-9 kilometers south of Rangamati town.		
Academic activities Started :	November 9, 2015 (2014-2015 session)		
Departments	Students Intake		
	Under Graduate Program	Graduate Program	
Dept. of CSE	246	26	
Dept. of MGT	253	38	
Dept. of Forestry	25	-	
Dept. of THM	25	-	
Current Students	549	64	
Faculty Members		**Officers and Staffs**	
29		**60**	

1.3 Administration

The Vice-Chancellor is the Chief Executive Officer of the university. The Chancellor of the university, honorable President of the People‟s Republic of Bangladesh, appoints the Vice-Chancellor for a four-year term. The administrative team comprises Vice-Chancellor, Registrar, Proctor, Director of Finance, Head of the Departments, Librarian, House Tutors, Head of Planning and Development Division, Controller of Examination, Chief of Medical Officer, Chief Engineering, Head of Public Relation office.

Department of Computer Science and Engineering

2.1 Vision:

To be a leading provider of high quality CSE programs in Bangladesh and to make RMSTU the number one choice for the students in the region by 2023.

2.2 Mission :

The mission of the Department of CSE are:

- To contribute to the information age of the world by preparing highly adored, productive and well-respected computer graduates.
- To develop our students with a strong foundation in education and experience keeping consistency with the increasing demand of computing in our society.
- To build up a vibrant research community comprising of faculty members, students and thus advancing the state of the art for the benefit of society by developing new ideas in research and inventions.
- To exploit the computational and research potentials of the Chattagram Hill Tracts of the country in information technology by collaborating with the key academic and industrial partners within and outside the RMSTU.
- To groom our students to face the Fourth Industrial Revolution (4IR).

2.3 Introduction

The Department of Computer Science and Engineering is the home of scholars and outstanding students and researchers who not only share the passion for Engineering but also possess the capability of turning ideas into reality. With the main educational goalto prepare students for research and teaching careers either in universities or in industry, the department started its journey in 2014. Today the department provides one of the strongest centers for computer science and engineering research, covering such diverse areas as image image processing, wireless communication, artificial intelligence, architecture, information and data management, network security, software engineering. The department of CSE has started the M.Sc. Engg./M. Enng. program in CSE from the session 2020-2021. With the student intake of 272 and 50 students per academic session in undergraduate and graduate level respectively, the department of CSE provides quality education with its competent faculty members and modern laboratories having state of the art equipment. About 26 graduates have already earned B.Sc. Engineering degree in this department. We are proud of our history and current status, and we strive towards continued excellence in research, education in tne field of Computer Science and Engineering.

2.4 Course Curriculum

The Department offers many up-to-date courses in the various branches of Computer Science and Engineering that include Object-Oriented Programming Language, Electrical, Electronics, Digital Logic and Design, Algorithm, Compiler Design, Software Engineering, Database Management System, Artificial Intelligence, Data Communications and

Networking, Network Security, Numerical Analysis, Theory of Computation, Computer Graphics, Fuzzy Logic and Neural Networks, Image processing, etc. Moreover, the students taught a few courses of Basic Electrical engineering. Students have to complete some courses on basic sciences, e.g. Physics, Mathematics and Chemistry. The courses on Accounting, Economics, Management, Sociology and English etc. are also mandatory. To meet the necessary demand of the research world, the academic committee of the department, comprised of faculty and other external experts from various fields, updates the course curriculum time-to-time. The department, and the university itself as whole, maintain the medium of instruction as well as evaluation process completely in English.

2.5 Laboratory Facilities

The state of the art of laboratory facilities in the Department of CSE provides a mechanism for the students to gain hands-on experience that will aid their understanding of the engineering and scientific theories taught in their classes. The Department has following laboratories: Computer Laboratory, Communication and Networking Laboratory, Digital Logic, Electronics and Electrical Laboratory, Microprocessor & Interfacing Laboratory etc.

2.6 Research Activities
Undergraduate Thesis and Projects

The faculty members of CSE department are involved in research work of different concentrations and they always encourage students to do research from the undergraduate level. A thesis oriented project course named as project & thesis worth of 4 credit hours is included in the syllabus of the undergraduate level. The main objective is to give students proper learning of how to do research and flourish their innovative ideas and implent their thoughts as real-world applications. Different topics relevant to Computer Science like Bioinformatics, Software Engineering, Algorithm Design, Dat mining, Green Technology, Communication Engineering, Networking, Robotics & Computer Vision etc. are covered in undergraduate thesis works.

2.7 Co-Curricular Activities

a. Computer Club

Department of Computer Science & Engineering () has started the activities of computer club which includes Web development, Software development, Programming contest, Mobile Application, Linux Operating System etc. for the betterment of the practical skills of the CSE students.

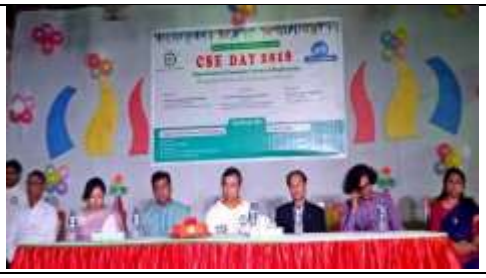
b. Programming Contest

The students of CSE department are doing a praiseworthy performance in logic developing. CSE department of RMSTU arranged programming contest several times in different occasions like CSE day, 16 December, 21 February etc. Besides students participate in different regional and national programming contest hosted and held in other universities of Bangladesh. RMSTU performs well in every contest regionally and nationally.

2.8 Events

a. CSE Day

The Day is for celebration and gathering of all Computer Science, Computer Engineering Personalities, and anyone interested about CSE. They come and learn about the many opportunities they possess in the industry or in academia. It is the premier outreach activity organized by the CSE Department of RMSTU every year on 09 November. The department of CSE observes CSE day every year and organizes Programming Contest, Project Show, Poster Presentation, Career Adda, Seminars, Cultural Night and many others throughout the whole day.



B. Seminars and Workshops

The Department of Computer Science and Engineering often arranges many seminars and workshops to provide students with the most comprehensive resources, updates and opportunities in the field of Computer Science and Engineering. The workshops provide world-class professional development training that is designed to educate students on relevant issues and equip them with the required skills and competencies.

Programming Contest

Data Mining

Prof. Dr. M. Moshiul Hoque

C. Annual Departmental Study Tour
The Department of CSE arrange annual Study Tour every year continuously.

		
Japhlong	Bhulagonj	Sylhet

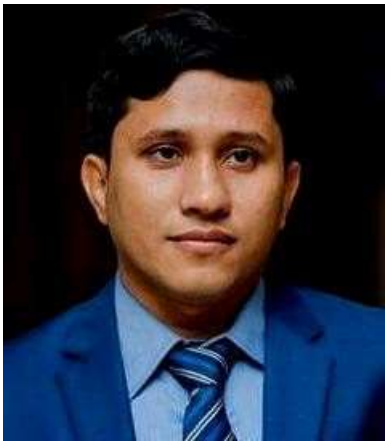
2.9 Consultancy

The Department of CSE provides consultancy services to various Government and private organizations for their proper and viable automation. The consultancy services cover the feasibility study (Technical and Financial); preparation of hardware and software specifications; design and development of software; network design and implementation; web site design, etc.

2.10 Faculty Members

Mr. Rana Jyoti Chakma
Associate Professor

Qualification:
Email:
Research Interest:



Mr. Juel Sikder
Assistant Professor

Qualification: B. Sc. & MS Egg., Department of CSE, University of Chittagong

Email:
Research Interest:

Mr. Dhiman Sarma
Assistant Professor

Qualification:
Email:
Research Interest:

Mr. Sajib Tripura
Assistant Professor

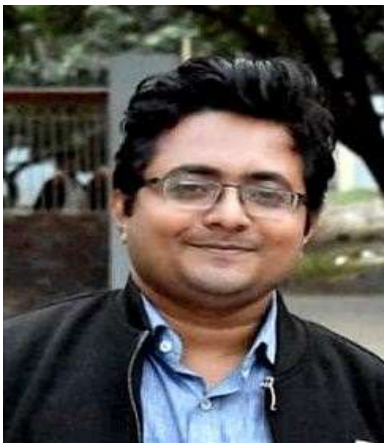
Qualification: B. Sc. Engg. & MS Egg., Department of CSE, University of Chittagong
Email: sajibtripura1987@gmail.com
Research Interest: Wireless Sensor Network, Big Data Mining, Human and Computer Interactions and IoT.

Mr. Tanjim Mahmud
Assistant Professor

Qualification: B. Sc. & MS Engg., Department of CSE, University of Chittagong

Email:

Research Interest:



Mr. Sayed Assaduzzaman
Assistant Professor

Qualification: B. Sc. & MS on Information and Communication Technology at Mawlana Bhashani Science and Technology University

Email:

Research Interest:

Mrs. Dhonita Tripura
Lecturer

Qualification: B. Sc. & MS on Information and Communication Technology, Jahangirnagar University

Email:

Research Interest:

Mr. Ahamed Imtiaz
Lecturer

Qualification: B.Sc. (Engg.) in Information and Communication Engineering at Pabna University of Science and Technology

MS in Information Technology at Institute of Information Technology, Jahangirnagar University

Email:

Research Interest:

Mr. Mithun Dutto

Lecturer

Qualification: B. Sc. & MS in Department of CSE, Jahangirnagar University

Email:
Research Interest:

Rishita Chakma

Lecturer

Qualification: B.Sc.(Engg.) & M. Sc.(Engg.) in EEE at Chittagong University of Engineering & Technology, Chittagong.
Email:
Research Interest:

Mahibul Abdullah Ibne Momin

Lecturer

Qualification: B.Sc. (Engg.)
Chittagong University of Engineering & Technology (CUET)

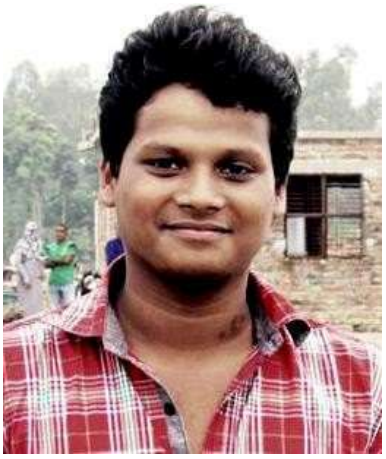
Email: tushar1304017@gmail.com
Research Interest:
1. Privacy Preserving Data Mining
2. IoT

Mohammad Mynoddin

Lecturer

Qualification: B.Sc. and M. Sc. in Information and Communication Technology at Comilla University

Email:
Research Interest:



G.M. Sakhawat Hossain

Lecturer

Qualification: BSC in CSE at Rajshahi University of Engineering & Technology
Email:
Research Interest:

3.1 Definitions:

In this Rules and Regulations, unless the context otherwise requires:
3.1.1 "University"means the Rangamati Science and Technology University abbreviated as RMSTU;
3.1.2 "Rules and Regulations" means Academic rules and regulations;
3.1.3 "Vice-Chancellor" means the Vice-Chancellor of the University;
3.1.4 "Registrar" means the Registrar of the University;
3.1.5 "Department" means concerned Academic Department of the University;
3.1.6 "Head" means the Head of the Academic Department;
3.1.7 "Chairman" means the Chairman of the Examination Committee of the University;
3.1.8 "Controller" means the Controller of Examinations of the University;
3.1.9 "Faculty" means the Teacher of the University;
3.1.10 "Student" means a student admitted in any Degree awarding Department of the University;
3.1.11 "Course System" means pass or fails on course basis;
3.1.12 "Failed Courses" means the courses registered but not appearing at the examination or not passed after appearing at the examination;
3.1.13 "Discontinuity" means failure to appear in all courses (theory and Sessional) in a particular semester.

3.2 Departments
Degree awarding Departments:

(i) Department of Computer Science and Engineering
(ii) Department of Management
(iii) Department of Forestry and Environmental Science
(iv) Department of Tourism and Hospitality Management

3.3 Rules of Program B. Sc. (Engineering) in CSE

1.**Admission:** Students will be admitted to the department as per university rules.

2.**Duration of the Program:** 4 years.

3.**Total Semesters:** 4x2=8 (2 semesters a year of 22 weeks each).

4.**Total Number of Credits in 8 semesters (4 years):** 160.0

5.Breakdown of each semester (of 22 weeks each)

a. Classes: 16 active weeks (1 day of each week must be reserved for makeup classes. If necessary, weekends can be used for makeup classes and extra/additional classes may be taken within the semester schedule to finish the course).
b. Break/PL: 10 days. No separate break for mid term examinations.
c. Semester Final Examinations: 3 weeks.
d. Evaluation of Scripts and Publication of Results: 3 weeks (2 weeks for grade submission and 1 week for tabulation and result publication).
e. Vacations: No separate semester break. Only the usual university vacations apply.

6. Teaching of the courses

a. For each credit of a theory course, there will be 1 class per week of 1 hour duration.
b. Total classes in a semester for each credit of a theory course will be 15 (15x1) weeks.
c. Total Contact Hours in a semester for each 1.0 credit theory course: 15x1=15.
d. For each 1.0 credit lab course, there will be 1 class per week of 2 hours duration.
e. Total classes in a semester for each 1.0 credit lab course in 15 weeks: 15x1=15.
f. Total Contact Hours in a semester for each 1.0 credit lab course: 15x2=30.

7. Evaluation of the courses

The answer scripts will be evaluated by two teachers within the department. In special case 2nd examiner may be selected from the similar department of the faculty or from other public universities.

8. **Grading System:** The current UGC approved grading system applies as per university rules.

Marks	Letter Grade	Grade Point
80% and Above	**A+**	**4.00**
75% to < 80%	**A**	**3.75**
70% to < 75%	**A-**	**3.50**
65% to < 70%	**B+**	**3.25**
60% to < 65%	**B**	**3.00**
55% to < 60%	**B-**	**2.75**
50% to < 55%	**C+**	**2.50**
45% to < 50%	**C**	**2.25**
40% to < 45%	**D**	**2.00**
Less Than 40%	**F**	**0.0**

9. Marks Distribution:

a. For a theory course:

i	**Attendance**	**05%**
ii	**Assignment/Presentation**	**05%**
iii	**Midterms (1^{st} + 2^{nd})[15%+15%]**	**30%**
iv	**Final Examination**	**60%**
	Total Marks	**100%**

b. For 9a (iii), at least 2 Midterms examinations should be taken. One near the $5^{th}/6^{th}$ week and the other near the $11^{th}/12^{th}$ week.

c. The subsections (i)-(iii) of (9a) will ONLY be evaluated by the respective course teacher.

Subsection (iv) will first be evaluated by the respective course teacher and, if necessary,it will be decided by the examination committee.

d. For a lab course:

i. Attendance	10%
ii. Reports /Design Work/Term Paper	10%
iii. Quiz /Viva	20%
iv. Term Final evaluation/Continuous Assessment	60%
Total Marks	**100%**

In each lab course, some assignments will be provided which have to be solved by the students individually or in a group. The total number of assignments given per lab course will be determined by the respective lab teachers. Each assignment has

to be submitted during the lab time on the same day as the assigning date or some time later on a different day which will be determined by the respective lab teachers. For late submission, there will be some sort of penalty which will also be determined by the respective lab teachers. There can be bonus marking, if needed and felt necessary by the respective lab teachers.

10. **Attendance:** Students with 75% attendance and above in each course will be eligible to sit for the semester final examinations. Students having attendance >=60% and <75% will be considered to sit for the examination after paying some required fines. Students having attendance below 60% to 40% will be granted to sit for the examination after having special permission from relevant university authority along with paying the required fines. The marks distribution for attendance is given below:

Attendance	Marks
90% and Above	**5.0**
85% to < 90%	**4.5**
80% to < 85%	**4.0**
75% to < 80%	**3.5**
70% to < 75%	**3.0**
65% to < 70%	**2.5**
60% to < 65%	**2.0**
55% to <60%	**1.5**
less than 55%	**1.0**

Percentage of attendance	Status	Fees/Fines
74% - 60%	Non-collegiate	TK 10000.00
59% - 40%	Pre-dis-collegiate	TK 30000.00
< 40%	Dis-collegiate	Not eligible for appearing exams

11. **Class Representative:** Each batch/section of students will have two class representatives (one male and one female) to maintain liaison with the Course teachers regarding their class progress and problems.

12. Examination Committee

a. The examination committee consisting of 4 teachers will be proposed by the Academic Committee of the department.

b. There will be an examination committee for every academic year.

c. The committee will consist of a Chairman, 2 internal members and an external member. The committee may have the external member from RMSTU or outside of RMSTU.

d. The Chairman of the examination committee, with the help of the committee members, will be responsible for getting questions from the respective course teachers, moderating the questions and printing them, holding examinations and publication of results.

13. Tabulators

a. The examination committee will appoint two tabulators.
b. Course teachers/examiners will submit their grade-sheets in details.
c. The tabulators will enter the marks given by each course teacher/examiner in the tabulation sheets independently and process the examination results.
d. The controller"s office will publish the examination results at the end of every semester and issue the transcripts.

14. Promotion from and the Final Degree

a. The required minimum CGPA (Cumulative Grade Point Average) for promotion one semester to the next semester will be 2.00 (year to year promotion).
b. $CGPA = \frac{\sum_i G_i C_i}{\sum_i C_i}$, where, G_i is the grade point obtained in course i and C_i is the corresponding credit.
c. The minimum GP of 2.00 is required in each theory course and an overall CGPA of 2.0 will be required for award of the B. Sc. Degree.
d. The Degree must be earned within the limit of 12 semesters, i.e. 6 academic years from the date of admission to the 1st semester.
e. There will be no option for grace.

15. Re-admission and Drop Out

a. A student failing to get promotion may seek re-admission to study with the following batch. In the case of re-admission, all previously earned grades for the two semesters of that year will be cancelled.
b. A student may take re-admission only 2 times. If required, a student may take re-admission in the same class, but the Degree must be completed within 6 years.
c. A student failing to get minimum required CGPA even after taking re-admission twice will be dropped out of the program.

17. Improvement of Grades

a. A student will be allowed maximum of 2 chances to clear F grade/grades with the immediate next batches by complying with the time requirement for the degree including final year (4^{th} year). A student will not be allowed for grade improvement once she/he is eligible for the degree. During the extra period for clearing F grades student will not be allowed to remain in residential halls.

b. A student getting F grade in any theory course (courses), has to attend only the final examination for that (those) course (courses).

c. A student may improve grade/grades of any course only once by reappearing at the examination with the immediate next batch if he/she obtains a grade less than B(GP=2.75) and the best grade that a student can achieve in case of grade improve is A-.

d. In addition to the usual fees, a fine, as per university rules, will be imposed for each course chosen for improvement.

e. A student will have to be mentally prepared to take the examination of a particular course chosen for improvement even if it is held on the same day of his/her other regular examination.

SUMMARY OF COURSES

Syllabus for the Degree of B. Sc. Engineering

First Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 1101	Computer Fundamentals Lab		1.5		3
CSE 1102	Structured Programming Language	3		3	
CSE 1103	Structured Programming Language Lab		1.5		3
EEE 1104	Basic Electrical Engineering	3		3	
EEE 1105	Basic Electrical Engineering Lab		1.5		3
Math 1106	Calculus	3		3	
Phy1107	Physics	3		3	
Phy 1108	Physics Lab		1.5		3
Eng 1109	English	2		2	
	Total for Semester	**14**	**6**	**14**	**12**
	Total for Semester (Theory + Laboratory)	**20**		**26**	
	Cumulative Total	**14**	**6**	**14**	**12**

Second Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 1201	Discrete Mathematics	3		3	
CSE 1202	Object Oriented Programming Language	3		3	
CSE 1203	Object Oriented Programming Language Lab		1.5		3
CSE1204	Digital Logic Design	3		3	
CSE1205	Digital Logic Design Lab		1.5		3
Math1206	Matrices, Differential Equation and Geometry	4		4	
Chem1207	Chemistry	3		3	
Eng1208	English Skill Development Lab		1.5		3
	Total for Semester	**16**	**4.5**	**16**	**9**
	Total for Semester (Theory + Laboratory)	**20.5**		**25**	
	Cumulative Total	**30**	**10.5**	**30**	**21**

Third Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 2101	Data Structures	3		3	
CSE 2102	Data Structures Lab		1.5		3
Math2103	Numerical Analysis	3		3	
Math2104	Numerical Analysis Lab		1.5		3
EEE2105	Engineering Drawing Lab		1.5		3
EEE 2106	Basic Electronic Devices and Circuits	3		3	
EEE 2107	Basic Electronic Devices and Circuits Lab		1.5		3
Math2108	Vector Calculus, linear Algebra and Complex variable	3		3	
Eco 2109	Engineering Economics	3		3	
	Total for Semester	**15**	**6**	**15**	**12**
	Total for Semester (Theory + Laboratory)	**21**		**27**	
	Cumulative Total	**45**	**16.5**	**45**	**33**

Fourth Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 2201	Database Management Systems	3		3	
CSE 2202	Database Management Systems Lab		1.5		3
CSE 2203	Computer Architecture and Organization	3		3	
CSE 2204	Design and Analysis of Algorithms	3		3	
CSE 2205	Design and Analysis of Algorithms Lab		1.5		3
CSE 2206	Microprocessors and Assembly Language	3		3	
CSE 2207	Microprocessors and Assembly Language Lab		1.5		3
CSE 2208	Software Development with java Lab		1.5		3
Stat 2209	Probability and Statistical Analysis	3		3	
	Total for Semester	**15**	**6**	**15**	**12**
	Total for Semester (Theory + Laboratory)	**21**		**21**	
	Cumulative Total	**60**	**22.5**	**60**	**45**

Fifth Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 3101	Computer Peripheral Device and Interfacing	3		3	
CSE 3102	Computer Peripheral Device and Interfacing Lab		1.5		3
CSE 3103	Operating Systems	3		3	
CSE 3104	Operating Systems Lab		1.5		3
CSE3105	Theory of Computation	3		3	
CSE 3106	Web Engineering Lab		1.5		3
CSE 3107	Compiler Designing	3		3	
CSE 3108	Compiler Designing Lab		1.5		3
Sco3109	Sociology and Ethics and Legal Aspects of Information	3		3	
	Total for Semester	**15**	**6**	**15**	**12**
Total for Semester (Theory + Laboratory)		**21**		**26**	
Cumulative Total		**75**	**28.5**	**75**	**57**

Sixth Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 3201	Data Communication	3		3	
CSE 3202	Data Communication Lab		1.5		3
CSE 3203	Software Engineering	3		3	
CSE 3204	Software Engineering Lab		1.5		3
CSE 3205	Artificial Intelligence	3		3	
CSE 3206	Artificial Intelligence Lab		1.5		3
CSE 3207	System Analysis and Design	3		3	
CSE 3208	System Analysis and Design Lab		1.5		3
LGE 3209	Scientific Report Writing Lab		1.5		3
Gen 3210	Bangladesh Studies	3		3	
	Total for Semester	**15**	**7.5**	**15**	**15**
Total for Semester (Theory + Laboratory)		**22.5**		**29**	
Cumulative Total		**90**	**36**	**90**	**72**

Seventh Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 4101	Project / Thesis		1		2
CSE 4102	Computer Networking	3		3	
CSE 4103	Computer Networking Lab		1.5		3
CSE 4104	Computer Graphics	3		3	
CSE 4105	Computer Graphics Lab		1.5		3
Mgt 4106	Financial, Cost and managerial Accounting	2		2	
CSE 4107	Industrial Attachment		2		3
	Option-I/Option-II	3		3	
	Total for Semester	**11**	**6**	**11**	**11**
Total for Semester (Theory + Laboratory)		**17**		**22**	
Cumulative Total		**101**	**42**	**101**	**83**

Eighth Semester

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 4201	Project / Thesis		3		5
CSE 4202	Engineering Management	2		2	
CSE 4203	Digital Systems Design	3		3	
CSE 4204	Digital Systems Design Lab		1.5		3
CSE 4205	Information Security	3		3	
	Option-I / Option-II(Theory)	3		3	
	Option-I / Option-II(Theory related Lab)		1.5		3
	Total for Semester	**11**	**6**	**11**	**11**
Total for Semester (Theory + Laboratory)		**17**		**22**	
Cumulative Total		**112**	**48**	**112**	**94**
Cumulative Grand Total (Theory + Laboratory)		**160**		**216**	

Option -I

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 5101	Optical Fiber Communications	3		3	
CSE 5102	Soft Computing	3		3	
CSE 5103	E-Commerce	3		3	
CSE 5104	Robotics	3		3	
CSE 5105	Natural Language Processing	3		3	
CSE 5106	Computer Vision	3		3	
CSE 5107	Object Oriented Analysis and Design	3		3	
CSE 5108	Bio-Informatics	3		3	
CSE 5109	Data Warehouse Systems	3		3	
CSE 5110	Management Information Systems	3		3	
CSE 5111	Special Topics related to CSE	3		3	
CSE 5112	Lab of Selected Topic / Lab of Special Topics related to CSE		1.5		3

Option-II

Course Code	Course Title	*Credits*		Hours/Week	
		Theory	*Laboratory*	*Theory*	*Laboratory*
CSE 5201	Mobile Computing	3		3	
CSE 5202	Geographical Information Systems	3		3	
CSE 5203	Parallel Computing	3		3	
CSE 5204	VLSI Design	3		3	
CSE 5205	Human Computer Interaction	3		3	
CSE 5206	Graph Theory	3		3	
CSE 5207	Multimedia Systems	3		3	
CSE 5208	Digital Signal Processing	3		3	
CSE 5209	Digital Image Processing	3		3	
CSE 5210	Special Topics related to CSE	3		3	
CSE 5211	Lab of Selected Topic / Lab of Special Topics related to CSE		1.5		3

Summary of the Syllabus

Course Type	**No. Credits in the Syllabus**	**% of Total Credits According to the UGC**	**% of Total Credits in the Syllabus**
Language and General Education	**18**	12-15	11.25%
Basic Science (Theory + Laboratory)	**10.5**	8-10	6.56%
Mathematics (Theory + Laboratory)	**14.5**	8-10	9.06%
Other Engineering	**12.5**	8-10	7.82%
Core Subjects (Theory + Laboratory)	**94.5**	40-50	59.06%
Elective Subjects	**10**	12-15	6.25%
Total	**160**	100%	100%

DETAILED OUTLINES OF COURSES

First Semester

CSE-1101; Computer Fundamentals Lab
1.5 Credits, 3 Hours/Week

Lab based on following contents:
Introduction to Computers: History and development Computer types, Hardware,Software, Operating System, Microprocessor, Scope of computer Impact of computers on society and technology.

Hardware: Basic organization and functional units of computers: CPU types, Speed variation, Memory type, size ,Cache Memory, Mass storage devices: Hard disk, Floppy disk, CD ROM, DVD, Memory:RAM, ROM, , I/O Devices: Keyboard, Printer**,** Different Peripherals.

System Software and Application Software: Types of software, System software, Application software, Function of Operating System, Discussion on different types of Operating Systems: DOS, Windows, Mac, UNIX .GUI.

NumberSystem: Concept of Bit, Byte, Word. BinaryArithmetic, Binary to Decimal Conversion, Logic Representation: Different Types of gates and their truth tables, Boolean algebra, De-Morgan‟s theorem, Conversionbetween Binary, Hexadecimal and Octal Numbers. **Representation of Characters by Bit- Array: ASCII, BCD and UTF-8.**

Maintenance and Troubleshooting: Classification of Stabilizer, UPS and IPS, Virus, Malware, Power Surge Protection, Disk maintenance.

CSE-1102; Structured Programming Language
3 Credits, 3 Hours/Week

Review of Basics: Computer, Memory, Compiler & Interpreter, Algorithm, Flowchart, Structured programming, Types of programming Language.
Introduction to C: Identifiers & Keywords, Data Type, ASCII Value, Variables, Expression & statements, Reading and Writing Character,
Formatted I/O: Specifying Widthusing Format specifier in printf and scanf in Details.
Operators: Arithmetic, Relational, Logical and Bitwise Operators, Assignment, Increment & Decrement, Type Conversion, Operator Precedence and Associativity.
Branching &Loops: Branching, Decision making techniques, LoopingBasic, Necessity of Loops, While Loop, For Loops, Do WhileLoop, **Nested Loop.**
Functions : Basic Functions: Library function, , Library Functions/Header Files Concept, User defined Function, Defining, Calling & declaring a Function, Function Body, Accessing a Function, Function Prototypes, Passing arguments to a function, Iteration and recursion, Call by Value, Call by Reference, Scope Visibility and Lifetime of Variable.
Arrays: Basics of Array, Necessity, One dimensional, Two dimensional & Multidimensional arrays declaration, Accessing throughIndices, Accessing using Loops.
Pointers: Basics, Uses, Pointer Operation, Call by Reference using Pointers, Pointer, Function and arrays.

Strings: Basics, Difference between String and Character Array, I/O of strings, Basic String Functions finding Length, Compare, Copy, Concatenate, Case Conversion, Reverse of strings.
Structures: Basics, Necessity, Declaration, Accessing, Initialization, Array of structures.
Dynamic Memory Allocation: Basics, Uses,Malloc, Free, Calloc, Realloc.
File Operation: Basics, Uses, FileOpening, Closing, and File I/O, Use of Redirect Operator to Write in Fileor Read from File.

CSE-1103; Structured Programming Language Lab
1.5 Credits, 3 Hours/Week

Laboratory work based on **CSE-1102**

EEE-1104; Basic Electrical Engineering
3 Credits, 3 Hours/Week

Resistor: Properties, Types of Resistors, Ohm"s Law, Power, Energy, Efficiency, etc.
Series DC Circuits: Kirchhoff"s Voltage Law, Voltage Divider Rule, Power Distribution, Voltage Regulation, Voltage Sourcesin Series, etc.
Parallel DC Circuits: Conductance and Resistance, Kirchhoff"s Current Law, Current Divider Rule, Open Circuit, Short Circuit, Voltage Sources in Parallel, etc.
DC Series Parallel Network: Reduce and Return Approach, Block Diagram Approach, Ladder Networks.
Methods of Analysis for DC Networks: Current Source, SourceConversion, Current Sources in Series and Parallel, Branch- Current Analysis, Mesh Analysis, Nodal Analysis, Bridge Network and Y-• and•-Y Conversions.
Network Theorems (DC): Superposition, Thevenin"s,Norton"s, Maximum Power Transfer, Millman"s, Substitution,Reciprocity, etc.
Capacitor: Electric Field, Capacitance, DielectricStrength, Leakage Current, Types of Capacitors, Charging andDischarging Phase, Energy Stored by a Capacitor, Capacitors in Series and Parallel.
Inductor: Magnetic Field, Inductance, Types ofInductors, Faraday"s Law and Lenz"s Law, Inductors in Series andParallel. R-L, R-C and R-L-C Circuits with DC Input.
Introduction toSinusoidal Alternating Waveforms: Definitions, General Format for theSinusoidal Voltage or Current, Phase Relations, Average and RMSValues etc. Ordinary and Frequency Response of Basic R, L and CElements, Average Power and Power Factor, Rectangular and Polar Form,Phasors.

EEE-1105; Basic Electrical Engineering Lab
1.5 Credits, 3 Hours/Week

Laboratory work based on **EEE-1104.**

Math-1106; Calculus
3 Credits, 3 Hours/Week

Differential Calculus: Limits, continuity and differentiability; Successive differentiation of various types of functions; Leibnitz"s Theorem; Rolle"s Theorem; Mean value Theorem; Expansion of functions; Evaluation of indeterminate forms by L"Hospitals rule; Partial differentiation; Euler's Theorem; Tangent and Normal; Maximum and minimum values of functions of single variable; Curvature, Asymptotes.

Integral Calculus: Definitions of integration; Integration by the method of substitutions; Integration

by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals and its use in summing series; Walli"s formula, Improper integrals, Beta function and Gamma function; Area under a plane curve; Area of the region enclosed by two curves; Volume of solids of revolution; multiple integrals and its application.

Phy-1107; Physics
3 Credits, 3 Hours/Week

Electromagnetism: Coulomb"s Law; Electric field; Gauss"s Law and its application; Electric potential; Capacitors and capacitance: Capacitors with dielectrics, Dielectrics an atomic view, Charging and discharging of a capacitor; Magneticfield: Magnetic induction, Magnetic force on a current carrying conductor, Torque on a current carrying loop, Hall effect; Faraday"s Law of electromagnetic induction; Lenz"s Law; Self-induction; Mutual induction; Magnetic properties of matter: Hysteresis curve; Maxwell equations.
Theories of light: Interference of light, Young"s double slit experiment, Fresnel Bi-prism, Interference at wedge shapedfilms, Newton"s rings, Interferometer; Diffraction of light: Fresnel and Fraunhofer diffractions, Diffraction by single slit,Diffraction from a circular aperture, Resolving power of optical instruments, Diffraction at double slit and N-slitsdiffraction grating; Polarization: Production and analysis of polarized light, Brewster"s Law, Malus Law, Polarization by double refraction, Retardation plates, Nicol prism, Optical activity, Polarimeters, Polartoids.

Phy 1108; Physics Lab
1.5 Credits, 3 Hours/Week
Laboratory work based on **EEE-1107.**
Or

(Recommended but not limited to the following topics)

List of Experiments
1. Determination of the spring constant and the effective mass of a loaded spring.
   Apparatus: A Spiral Spring, Convenient masses with hanging arrangement, Clamp or a hook attached to a rigid Framework of heavy metal rods, stopwatch, etc.
2. Determination of unknown resistances and verification of the laws of resistances by P.O Box. Apparatus: Post Office Box, Galvanometer, Unknown resistances, Resistance, Connecting wires, Key, etc.
3. Comparison of EMF of two Cells.
   Apparatus: Galvanometer, Potentiometer, Two cells, Battery, 6V, Connecting wires, Rheostat, 3 way key, etc.
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4. Determination of the moment of inertia of a flywheel about its axis of rotation.
   Apparatus: A flywheel with counter, thread, weight, etc.
5. Determination of rigidity modulus of the material of a wire by static method.
   Apparatus: Rigidity apparatus, Slide calipers, Screw gauge, Weights, Meter scale, Steel wires etc.
6. Determination of the pressure-coefficient of air by Constant Volume Air Thermometer.
   Apparatus: Jolly"s thermometer, Hg-Barometer, Heating bath, Thermometers, Gas burner, Stands and Clamps, etc.
7. Determination of the thermal conductivity of a bad conductor by Lee's method.
   Apparatus: Lec"s and Chorlton"s apparatus, Slide Callipers, Thermometers, Watch, Stands and Clamps, Rubber tubes, etc.
8. To plot the thermo-electromotive force temperature, Calibration, curve for a given thermocouple. Apparatus: Thermocouple, Resistance box, Potentiometer, Thermometer, Sensitive Galvanometer, Wires, Ice, Water, Stands and Clamps, etc.

9. Determination of the melting point of a solid using the calibration curve obtained in Experiment-8. Apparatus: Thermocouple, Resistance box, Potentiometer, Sensitive Galvanometer, Wires, Solid, wax, Ice, Watch, beakers, etc.

10. Determination of mechanical equivalent of heat by electrical method. Apparatus: Joule"s calorimeter, Voltmeter, Ammeter, Thermometer, Stopwatch, Connecting wires, balance, Stand and clamp, etc.

11. Determination of the focal length of i. a convex lens by displacement method and ii. a concave lens by an auxiliary lens method. Apparatus: Optical bench, Convex lens, Concave lens, Screen, Index rod, Lamp, meter scale, etc.

12. Determination of the refractive index of a liquid by plane mirror and a pin method using a convex lens. Apparatus: A convex lens, Plane mirror, Pin, Spherometer, Slide Callipers, Stands and clamp, Liquid, Water, etc.

13. Determination of the specific rotation of sugar solution by a Polarimeter. Apparatus: A Polarimeter or Sacharimeter, Sodium lamp, Sugar, Balance, Graduated cylinder, Beaker, Filter paper, Thermometer, etc.

14. Measurement of the refractive index of the material of a prism with the help of a spectrometer. Apparatus: Spectrometer, Prism, sodium lamp arrangement, Spirit level, etc.

15. Determination of the radius of curvature of a plenoconvex lens by Newton"s method. Apparatus: Newton"s Ring apparatus, Sodium lamp, Glass side, Stands and Clamps, etc.

Eng- 1109; English

2 Credits, 2 Hours/Week

Grammar: Grammatical Principles, Tense, Article, Preposition; Clause; Structure of sentences: simple, complex, compound; Subject-verb agreement,Modals, Phrases &Idioms, Prefixes& Suffixes, Wh & Yes/No Questions, Conditional Sentences.

Vocabulary: Technical& Scientific Vocabulary, Defining Terms.

Listening: Listening for comprehension, listening for general information, listening for specific information, listening for gist of details, listening for note taking

Spoken English: Introduction To Phonetic Symbols, Dialogue, Responding to particular Situations; Different modes of interaction: free conversation, group discussion, debate, public speaking, formal and informal presentation

Reading: Comprehension of Technical & Non-Technical Materials-Skimming, Scanning, Inferring & Responding To Context.

Technical Writing: Paragraph & Composition Writing On Scientific & Other Themes, Report Writing, Research Paper Writing, Library References.

Professional Communication: Business Letter, Job Application, Memos, Quotations, Tender Notice.

Second Semester

CSE-1201; Discrete Mathematics

3 Credits, 3 Hours/Week

Logics and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs.

Set, Function, Sequence, Summation and Matrix: Sets, Set Operations, Functions, Sequences and Summations, Zero – One Matrices, Boolean Product.

Number Theory: Divisibility and Modular Arithmetic, Integer Representations and Algorithms, Primes and Greatest Common Divisors, Modular Exponentiation.

Induction: Mathematical Induction. **Counting:** The Basics of Counting, the Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations. **Recursion:** Applications of Recurrence Relations.

Inclusion Exclusion: Inclusion – Exclusion. **Relations:** Relations and Their Properties, Representing Relations. **Graphs:** Graphs and Graph Models, Graph Terminology and Special Types of Graph, Euler and Hamilton Paths. **Trees:** Introduction to Trees.

CSE-1202; Object Oriented Programming Language

3 Credits, 3 Hours/Week

Introduction to Object Oriented Programming Language (OOPL): History of OOPL**,** OOPL Class Libraries**,** Introduction to OOPL Programming**,** A Simple Program**.**

Developing OOPL Application: Introduction, Algorithms, Pseudo code, Control Structure, The If /Else Selection Structure, The While Repetition Structure, Assignment Operators, Increment and Decrement Operators, Primitive Data Types, Common Escape Sequence, Logical Operator

Control Structure: Introduction, The For Structure, The Switch Structure, The Do/While Structure, The Break and Continue Structure**.**

Methods: Introduction, Program Module in OOPL, Math Class Methods, Method Definitions, OOPL API Packages, Automatic Variables, Recursion, Method Overloading, Method of the Applet Class**. Arrays :**Introduction, Arrays, Declaring and Allocating Arrays, Passing Arrays to Methods, Sorting Arrays, Searching Arrays, Multiple-Subscripted Arrays

Object-Based Programming: Introduction, Implementing a Time Abstract Data Type with a Class, Class Scope, Controlling Access to Members, Utility Methods, Constructors, Using Overload Constructor, Using Set and Get Method, Software Reusability, Friendly Members, Finalizers, Static Class Members, Data Abstraction and Information Hiding

Object-Oriented Programming: Introduction, Superclasses and Subclasses, Protected Members, Using Constructor and Finalizers in Subclasses, Composition vs. Inheritance, Introduction to polymorphism, Dynamic method building, Final Methods and Classes, Abstract Superclasses and Concrete Classes**.**

String and Characters, Graphics, Exception Handling, Files and Stream, OOPL API, Utility Classes, 2D Graphics, GUI, Swing, Events.

CSE-1203; Object Oriented Programming Language Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on **CSE-1202.**

CSE-1204; Digital Logic Design
3 Credits, 3 Hours/Week

Introduction: Introductory Concepts, Decimal, Binary, Octal and Hexadecimal Number System, Conversion of different number Systems, BCD, ASCII, ASCH and EBCDIC Codes.
Combinatorial Logic: Data Representation, Logic Gates and Boolean Algebra, De Morgan‟s theorem, Combinational Circuits Design using NAND of NOR Gates Only, Introduction to Decision Diagram, Algebraic Simplification, Karnaugh Map.

Sequential Logic: NAND and NOR Latches. Clocked SR, JK, S, D and T Flip -Flops, FF Timing Consideration, Master- Slave FF.
Complex Sequential logic: Frequency Division and Counting, Asynchronous Ripple Up and Down Counters, Counters with Any MOD Numbers, Asynchronous IC Counters, Propagation Delay. Parallel Up Downand Up/Down Counters, Presentable Counters, The 74193 Counter, Decoding a Counter, Cascading Counters, Shift Registers, IC Shift Digital Clock.
MSI Logic Circuits: BCD to Decimal Decoders, BCD to 7 Segment Decoder/Drivers, Encoders, Multiplexer and Demultiplexer.
Integrated Circuits Logic Families: TTL Logic Family Standard TTL Series Characteristics, Other TTL Series TTL Loading Rules, Digital MOSFET Circuits.
Memory Devices: Semiconductor Memory Technologies, ROM Architecture Timing and Type of ROM, EPROM, EEPROM,ROM Applications, RAM Architecture, Static and Dynamic RAM, Introduction to Sequential Circuits, Formal Representation of Sequential Circuits.
Arithmetic circuits: The Half- Adder Full Adder. Parallel Adders.

CSE-1205; Digital Logic Design Lab
1.5 Credits, 3 Hours/Week
Laboratory work based on **CSE-1204.**

Math-1206; Matrices, Differential Equation & Geometry
4 Credits, 4 Hours/Week

Matrices: Definition of Matrix, Different Types of Matrices, Algebraic Operations on Matrices, Adjoin and Inverse of a Matrix, Rank and Elementary Transformations of Matrices, Normal and Canonical Forms, Diogonalisation of Matrices, Solution of Linear Equations, Vector Spaces, Characteristic Roots and Vectors.

Vector Analysis: Scalar and Vectors, Operation of Vectors, Scalar and Vector Product of Two, Three and Four Vectors-Their Applications, Vector Components in Spherical And Cylindrical Systems, Derivative of Vectors, Vector Operation, DEL, Gradient, Divergence and Curl- Their Physical Significance, Vector Differentiation and Integration- Their Applications.

Geometry: Review of Equation for Straight Line, Circle, Parabola, Ellipse, Hyperbola, Pair of Straight Lines, General Equation of Second Degree, Three Dimensional Co-Ordinates, Equation For Planes, Spheres, Cylinder, Cone, Ellipsoid and Paraboloid.

Chem-1207; Chemistry

3 Credits, 3 Hours/Week

Atomic Structure: Bohr atomic model. Wave nature of electron. Heisenberg uncertainty principle.Schrodinger equation. Quantum numbers. Pauli exclusion principle. Afbau principle. Hund"s rule.Electronic configuration.

Periodic Table: s, p, d and f-block elements. Periodic law. Ionizationpotential. Electro-negativity. Electron affinity. Atomic radii. Diagonal relationship. Metals, semi metals, metalloids, non-metals and their properties.

Noble Gases: Occurrence. Properties and uses.

Chemical Bonding: (a) Strong bond: Ionic bond, covalent bond. Coordinate covalent bond and their properties. (b) Weak bond: Hydrogen bond, Vander Waal"s force.

Oxidation Reduction: Charge concept. Electronic concept. Oxidizing agent. Reducing agent. Oxidation number. Balancing the oxidation reduction equation.

Acid Base: Bronsted concept. Lewis concept. Ionization of water. pH. Transmission curve. Indicators. Buffer. Handerson equation.

State of Matter: (a) Solid. Liquid.Gas and their differences. (b) Gas laws: Boyle"s law, Charles" law, Avogadro"s law. Ideal gas. Real gas. Ideal gas equation. Vander Waal"s equation. Kinetic theory of gases.

Solutions: Types of solution. Units of solution concentration. Collegative properties. Raoult"s law. Elebation of boiling point. Depression of freezing point. Solubility of gases. Osmotic pressure.

Phase Rule: Definition. Phase rule of water and carbon dioxide.

Thermodynamics: First law. Second law. Third law and their application.

Chemical Kinetics: Rate law. Rate equation. Order of a reaction. First order reaction. Half life.

Chemical Equilibrium: Equilibrium. Mass action law. Equilibrium constant.

Electrochemistry: Conductance. Resistance. Equivalence conductance. Faraday"s law. Electrolytes. Electrolytic cell.

Selective Organic Reactions: FriedelCraff"s reaction. Alkylation reaction.

Markonikov reaction. Grignard reagent. Aromatic compounds. Aldehyde. Ketone. Alcohol. Amine.

Eng 1208; English Skill Development Lab

1.5 Credits, 3 Hours/Week

Lab based on following contents:

Listening: Listening for comprehension, listening for general information, listening for specific information, listening for gist of details, listening for note taking.

Speaking: Speaking in different contexts: everyday life, academic and business situations; different modes of interaction: free conversation, group discussion, debate, public speaking, formal and informal presentation, seminar presentation; useful language functions: definition, description, narration, instruction, explanation, circumlocution, exemplification, argumentation, generalization & specification, cause and effect.

Reading: Reading strategies: skimming, scanning, predicting, inferring; receptive reading, reflective reading, extensive reading, intensive reading, reading for note taking and research, reading for vocabulary development, sense of a text: syntactic knowledge, morphological knowledge, general world knowledge, socio-cultural knowledge, topic knowledge, genre knowledge; reading passages for comprehension, reading selected stories written by some classic writers.

Writing: Some grammatical problems: tense, article, preposition; phrase, clause; structure of sentences: simple, complex, compound; subject-verb agreement, conditionals. Discursive and creative writing: using different writing strategies: description, narration, cause and effect, classification and division, exemplification, argumentation and persuasion. Tasks: paragraph and essay writing, journal writing, self and peer editing, note taking.

Third Semester

CSE 2101; Data Structure

3 Credits, 3 Hours/Week

Basic: Basic Data Structures and Representation of Data. Data Structures Operations.
Linear Data Structures: Arrays, Records, Pointer, Recursion, Data Structures" Operations on them. Preliminary idea of algorithm runtime complexity (Big Oh notation), preliminary idea of data structure space complexity.
Stack and Queue: Basic stack operations (push/pop/peek),stack-class implementation using Array and linked list, in-fix to post-fix expressions conversion and evaluation, balancing parentheses using stack, basic queue operations (enqueue, dequeue), circular queue/ dequeue, queue-class implementation using array and linked list, application- Josephous problem, palindrome checker using stack and queue.
LinkedList: Singly/doubly/circular linked lists, basic operations on linked list (insertion, deletion and traverse), dynamic array and its application.
Trees: Binary tree representation using array and pointers, traversal of Binary Tree (in-order, pre-order and postorder,Insertion, Deletion and Searching, Binary Search Trees, B+ Trees, Indexing, Heap, Heapsort, , Fibonacci heaps, Heap Property, Heapify, Building and Maintaining a Heap, Huffman"s Algorithm, Binomial Heaps.
Searching: Linear search, binary Search, application of Binary Search- finding element in a sorted array, finding nth root of a real number, solving equations.
Recursion: Basic idea of recursion,tracing output of a recursive function, applications- merge sort, permutation,combination.
Sorting: Insertion sort, selection sort, bubble sort,merge sort, quick sort, distribution sort, lower bounds for sorting,external sort.
Huffman Coding: Implementation, application- Compression.
Graph: Graph representation(adjacency matrix/adjacency list), basic operations on graph(node/edge insertion and deletion), Sequential and Linked Representation of a Graph on Memory,traversing a graph: breadth-first search (BFS), depth-first search (DFS), graph-bicoloring.
Hashing Techniques: Characteristics of Hash Functions, Collision Resolution, Probing Chaining, Perfect Hashing.
Data Structures for Disjoint Sets: Disjoint Set Operations, Linked List Representation of Disjoint set, Disjoint Set Forests.
Augmenting Data Structures: Dynamic order Statistics, How to Augment a Data Structure, Interval Trees. Searching and Sorting Techniques in Different Structures.

CSE 2102; Data Structures Lab

1.5 Credit, 3 Hours/Weeks

Laboratory work based on CSE 2101.

Or

(Recommended but not limited to the following topics)

- Testing Comparator
- Sorting code of bubble, selection, merge, insertion
- Generator, Abstract generator, prime generator, get prime.
- Linked list programming.
- Stack implementation both sequential and linked list
- Queue implementation both sequential and linked list
- Implementation of tree, tree traversals.
- Binary Search Trees: Bounded Depth Search Trees
- Implementation of Heap, Heap sort

- Implementation of Hashing
- Implementation of large programs using array data structure
- Implementations of binary search trees, 2-D trees and heap
- Implementation of Warshall"s algorithm, BFS, DFS and topological sorting
- Implementation of different sorting algorithms

Math 2103; Numerical Analysis

3 Credits, 3 Hours/Weeks

Numerical analysis: Computer Number Systems; Overflow and underflow; Approximation in numerical computation;Truncation and round off errors; Propagation and control of round off errors; Chopping and rounding off errors; Pitfalls(hazards) in numerical computations (ill conditioned and well conditioned problems). Interpolation: Lagrange"s Interpolation, Newton"s forward & backward Interpolation Formula. Extrapolation; Newton"s Divided Difference Formula; Error; Problems. Numerical Differentiation: Use of Newton"s forward and backward interpolation formula only. Numerical Integration: Trapezoidal formula (composite); Simson"s 1/3rd formula (composite); Romberg Integration (statement only); Problems. Numerical Solution of System of Linear Equations: Gauss elimination method; Matrix Inversion; Operations Count; LU Factorization Method (Crout"s Method); Gauss-Jordan Method; Gauss-Seidel Method; Sufficient Condition of Convergence. Numerical Solution of Algebraic and Transcendental

Equations: Iteration Method; Bisection Method; Secant Method; Regula-Falsi Method; Newton-Raphson Method.

Numerical solution of Initial Value Problems of First Order Ordinary Differential Equations: Taylor"s Series Method; Euler"s Method; Runge-Kutta Method (4th order); Modified Euler"s Method and Adams-Moulton Method.

Math 2104; Numerical Analysis Lab

1.5 Credits, 3 Hours/Weeks

Laboratory work based on **Math 2103**.

EEE 2105; Engineering Drawing Lab

1.5 Credits, 3 Hours/Week

Lab based on following contents:

Orthographic projection: Concept of axes, plane and quadrant, Scale drawing, Sectional view, Top and side view Isometric views, Missing line, Auxiliary view, Pictorial views.

Drawing standard and practices: Interpenetrating of surface, Development of surfaces, Machine drawings, and Technical sketching.

Basic Concept of Computer Aided Design (CAD): Project on Engineering Drawing and CAD using Contemporary packages in engineering drawing.

EEE 2106; Basic Electronic Devices and Circuits

3 Credits, 3 Hours/Week

Theory of Semiconductors: Electronic Structure of The Elements, Energy Level, Energy Band Theory of Crystal, Energy Band Diagram of insulator, Semiconductor and Metal, p-type and n-type semiconductors; Free Electron Theory, Bond Structure of Silicon and Germanium, intrinsic and Extrinsic Semiconductor, Fermi Level, Concept of Hole, Carrier Densities, Generation and

Recombination of Excess Carriers, Carrier Life Time, Carrier Movement By Diffusion and Drift, Continuity Equation.

Semiconductor Diodes: The PN Junction:formation, properties and V-I characteristics,Basic constructions, characteristics, operations and uses of special diodes: Light-emitting diode (LED), Zener diode etc. Biasing Conditions, V-I Characteristics, Half Wave and Full Wave Rectification With Filtering, efficiency, Ripple factor, Filter circuits – capacitor input filter, LC filter and Π-filter,Clipping and Clamping Circuit, Zener Diode, Regulated power supply using zener diode. pn junction diode:

Bipolar Transistor: Junction Transistors, PNP and NPN Transistors, Principle of Operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), Biasing, BJT biasing, load lines; BJTs at low frequencies; Hybrid model, h parameters, simplified hybrid model; Small-signal analysis of single and multi-stage amplifiers Characteristics in Different Conditions, frequency response of BJT amplifier .Transistor Switching Time, DC and AC Load Line, Q Factor, Transistor As a Circuit Element, Transistor Equivalent Circuit.

Field Effect Transistor(FET): Low and high frequency models of FETs, biasing of FETs, Switching circuits using FETs, Construction of JFET, Characteristics and Principle of Operation, Characteristics Parameters, FET Biasing, Introduction to CMOS,

MOSFET: Different Types, Operation, Characteristics Curve, DC Biasing of Depletion and Enhancement Type MOSFET, DC biasing of JFET, Depletion and enhancement type NMOS and PMOS;

Operational Amplifiers (OPAMP): linear applications of OPAMPs, gain, input and output impedances, active filters, frequency response and noise. Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes. Stabilizer and UPS.

Other Semiconductor Devices: Transistor, SCR, UJT, DIAC, TRIAC, Photo Diode, Photo Transistor, Solar Cells, LED and LCD.

Amplifier: Voltage and Current Amplifiers, Differential Amplifiers, Operational Amplifiers (Opamps), Linear Applications of OPAMP, Gain, input and Output Impedance.

integrated-Circuit Logic Families: Digital IC Terminology, TTL Logic Family, TTL Series Characteristics, Open-Collector TTL, Tristate TTL, ECL Family, MOS Digital Ics, MOSFET, CMOS Characteristics, CMOS Tristate Logic, TTL-CMOS-TTL Interfacing.

EEE 2107; Basic Electronic Devices and Circuits Lab

1.5 Credit, 3 Hours/Week

Laboratory work based on *CSE 2106*

Or

(Recommended but not limited to the following topics)

- Verification of Diode characteristics using Forward and Reversed biased.
- Applications of diodes in the Half Wave and Full wave circuits.
- Verification of Common Based Transistor Characteristics for PNP and NPN Transistor.
- Verification of Common Emitter Transistor Characteristics for PNP and NPN Transistor.
- Verification of Common Collector Transistor Characteristics for PNP and NPN Transistor.
- Load-line and Output Characteristics using Common Emitter Connection
- Design of Integrator and Differential Operational amplifiers using different gains.
- Design of First order active filters circuit.

Math 2108; Vector Calculus, Linear Algebra and Complex variable

3 Credits, 3 Hours/Weeks

Vector Calculus: Multiple products of vectors; Differentiation and integration of vectors together with elementary applications; Gradient, divergence and curl of point functions; Various formulae; Definition of line, surface and volume integrals; Green's theorem; Gauss' divergence theorem; Stokes' theorem.
Linear Algebra: Introduction to systems of linear equations; Inverse of a matrix; Euclidean n-space; Linear transformations from IR^n to IR^m: Kernel and Range. Properties of linear transformations from IR^n to IR^m; Real vector spaces and subspaces; Basis and Dimension, Rank and Nullity; Eigen values and eigen vectors; Cayley-Hamilton theorem; Diagonalization.
Complex Variables: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorems, Complex differentiation and the Cauchy-Riemann equations, Infinite series, Convergence and uniform convergence, Line integral of a complex function, Cauchy's integral formula, Liouville"s theorem, Taylor"s and Laurent"s theorem, Singular points, Residue, Cauchy"s residue theorem, Contour integration and conformal mapping, Application in engineering problems.

Eco 2109; Engineering Economics

3 Credits, 3 Hours/Week

Fundamental Economics: Definition and scope, demand and supply, market equilibrium, elasticity, utility analysis (consumer behavior), theory of production, theory of cost, and market structure(perfectly competitive market and monopoly), Economics and engineering.
Macroeconomics: National Income, circular flow of income, aggregate demand and aggregate supply, inflation, devaluation , unemployment, consumption and saving function, investment function, IS and LM model, fiscal and monetary policy.
International Economics: The pure theory of international trade, foreign currency reserve of Bangladesh. Cost-benefit analysis; payback period, net present value (NPV), internal rate of return (IRR); economic feasibility of engineering undertakings; Development Economics.

Fourth Semester

CSE 2201; Database Management Systems

3 Credits, 3 Hours/Week

Introduction: Purpose of Database Systems, Data Abstraction, Data Models, Instances and Schemes, Data Independence, Data Definition Language, Data Manipulation Language, Database Manager, Database administrator, Database Users, Overall System Structure, Advantages and Disadvantage of a Database Systems. Data Mining and analysis, Database Architecture, History of Database Systems

Relationship Entity-Model: Entities and Entity Sets, Relationships and Relationship Sets, Attributes, Composite and Multivalued Attributes, Mapping Constraints, Keys, Entity-Relationship Diagram, Reducing of E-R Diagram to Tables, Generalization, Attribute Inheritance, Aggregation, Alternative E-R Notatios, Design of an E-R Database Scheme.

Relational Model: Structure of Relational Database, Fundamental Relational Algebra Operations, The Tuple Relational Calculus, The Domain Relational Calculus, Modifying the Database.

Relational Commercial Language: SQL, Basic structure of SQL Queries, Query-by-Example, Quel, Nested Sub queries, Complex queries, Integrity Constraints, Authorization, Dynamic SQL, Recursive Queries, Overview of PL/SQL.

Relational Database Design: Pitfalls in Relational Database Design, Functional Dependency Theory, Normalization using Functional Dependencies, Normalization using Multivalued Dependencies, Normalization using join Dependencies, Database Design Process.

File and System Structure: Overall System Structure, Physical Storage Media, File Organization, RAID, Organization of Records into Blocks, Sequential Files, Mapping Relational Data to Files, Data Dictionary Storage, Buffer Management.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ -Tree Index Files, B-Tree Index Files, Static and Dynamic Hash Function, Comparison of Indexing and Hashing, Index Definition in SQL, Multiple Key Access.

Query Processing and Optimization: Query Interpretation, Equivalence of Expressions, Estimation of Query-Processing Cost, Estimation of Costs of Access Using Indices, Join Strategies, Join Strategies for parallel Processing, Structure of the query Optimizer, Transformation of Relational Expression

Concurrency Control: Schedules, Testing for Serializability, Lock-Based Protocols, Timestamp-Based Protocols, Validation Techniques, Multiple Granularity, Multiversion Schemes, Insert and Delete Operations, Deadlock Handling.

Distributed Database: Structure of Distributed Databases, Trade-off in Distributing the Database, Design of Distributed Database, Transparency and Autonomy, Distributed Query Processing, Recovery in Distributed Systems, Commit Protocols, Concurrency Control, Shared Server Configuration.

Data Mining: Data analysis and OLAP, Data Warehouse, Data Mining, Overview of Data Mining Techniques Information Retrieval and Structured Data. Basic of Ontology.

Administrative Functionalities: Architecture of a Database, Concept of Physical and Logical Databases Tablespaces, Database Creation, Maintaining Data Dictionary, Database Backup/Recovery, Database maintaining and Performance Tuning, Data Guard- Physical, logical and Standby Database.

CSE 2202; Database Management Systems Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on **CSE 2201**

Or

(Recommended but not limited to the following topics)

- Basic introduction of different types of DBMS software
- Implementation of basic SQL commands to create and delete tables
- Implementation of basic SQL commands for inserting data
- Implementation of SQL Commands to modify table structure
- Implementation of SQL Commands to modify table structure data
- Case implementation of different queries using SQL
- Case production of different queries using SQL
- Case implementation & production of different queries using SQL
- Advanced SQL commands to implement referential integrity
- Advanced SQL commands to implement referential triggers
- Demonstrations of database connectivity of different database server using ODBC
- Design of user interface to connect to the database server

CSE 2203; Computer Architecture and Organization

3 Credits, 3 Hours/Week

Introduction: Computer Organization and Architecture, Structure and Functions, Why Study Computer Organization and Architecture?

Top-Level View of Computer Function and Interconnection: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, Peripheral Component Interconnect (PCI), Design a Simple Computer

Processor Logic Design: Processor Organization, Arithmetic Logic Unit, arithmetic and logical operations, floating point operations, Design of Arithmetic Circuit, Design of Logic circuit, Design of Arithmetic Logic Unit, Status Register Design of shifter, Processor unit, data paths-single cycle and multicycle implementations;

Basic Accumulator based CPU: Organization, instruction set, programming considerations, RISC & CISC Processors- Instruction Sets, addressing Modes. **Introductionto the Basic MIPS:** Instruction Set. **Fixed Point ALUs:** Combinational and Sequential ALUs, ALU Expansion. **Hazards**: Structural, Data and Control hazards; Exceptions,**Pipeline:** pipelined data path and control, superscalar and dynamic pipelining.

Memory Organization: Characteristics of Memory Systems, Memory Types, Performance and Cost, Access Modes, Memory Retention, Other Characteristics of Memory, Random Access Memory (RAM), RAM Organization, RAM Design, Memory System, Multilevel Memories,**Cache**: Cache Memory Principles, Cache Organization, virtual memory;Interrupts, Buses. translation and virtualization, synchronization, consistency and coherence, direct-mapped and associative caches; write-through and write-back caches, pipelined caches, analyzing memory performance;

Multiprocessor: Types of multiprocessors, SISD, SIMD, and MIMD architectures, performance, single bus multiprocessors, multiprocessors connected by network, clusters, Parallel processing,Introduction to RISC and CISC machines, Introduction to supercomputers.

CSE 2204; Design and Analysis of Algorithms

3 Credits, 3 Hours/Week

Foundations: The Role Of Algorithms in Computing, Analyzing and Designing Algorithms, Pseudocode conventions, Recursive Algorithms.

Performance Analysis: Time and Space Complexity, Asymptotic Notation(O, Ω, Θ), Randomized Algorithm, Growth Of Functions. Notations For Describing Growth Of Functions.

Divide & Conquer Method: Binary Search. Finding The Maximum and Minimum. Merge Sort,. Quicksort and Randomized Quicksort and Their Analytic Comparison,

Selection: A worse-case optimal algorithm.

The Greedy Method: The General Method, Knapsack Problem. Job Sequencing with Deadlines, Minimum Cost Spanning Trees:Prim and Kruskal‟s Algorithms. Single Source Shortest Paths – Dijkstra‟s Algorithm.

Dynamic Programming: Basic idea, Single Source Shortest Paths – Bellman-Ford Algorithm. All Pairs Shortest Paths: 0/1 Knapsack Optimal Binary Search Trees(*). The Travelling Salesperson Problem. Matrix Chain Multiplication and Longest Common Subsequence Algorithms. Longest Increasing subsequence (LIS),coin related problems, Applications of Dynamic programming.

Basic Traversal and Search Techniques: Breadth First and Depth First Search in Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS, Topological sorting.

***NP*- Hard and *NP*-Complete Problems**: Basic Concepts, *NP*-hard graph problem, *NP*-hard Scheduling Problem.

Branch-And-Bound: Least Cost(LC) Search, Bounding, FIFO Branch And Bound ,LC Branch And Bound, 0/1 Knapsack Problem: FIFO Branch And Bound Solution ,LC Branch And Bound Solution.

Lower Bound Theory: Comparison Trees, Lower Bounds Through Reductions: Finding the convex Hull, Disjoint Sets Problem, Multiplying Triangular Matrics.

Network Flow: Flow Networks, Max-Flow Min-cut theorem, Ford Fulkerson method and its limitation, Edmonds Karp algorithm, Maximum bipartite matching, minimum path cover, edge cover.

CSE 2205; Design and Analysis of Algorithms Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on ***CSE 2204***

Or

(Recommended but not limited to the following topics)

- Link list Experiment : (a) Add and (b) Delete data from link list.
- Stack : (a) Add and (b) Delete form the stack.
- Queue : (a) Add and (b) Delete the item from the queue
- Binary Search Tree.
- Sorting experiment using Quick Sort Algorithms.
- Sorting experiment using Merge Sort Algorithms.
- Search experiment using Depth-first search method.
- Search experiment using Breadth-first search method.
- Implement minimum spanning tree using Krusral Algorithms.
- Implement minimum spanning tree using Prim Algorithms.
- Calculate the shortest path using Dijkstra Algorithms.
- Implement B Trees Algorithms.
  Or
- **Hashing:** Linear Probe, Quadratic Probe, Double hashing, Random hashing.
- **Computational Geometry:** Vector Cross Product, segment intersection, point inside a polygon (convex), area of a polygon,convex hull, Line, Segment, circle intersection,
- **Number Theory:**Sieve of Eratosthenes, Chinese Remainder Theorem, Euler phi, extended Euclid, application of prime factorization application of phi.
- **Backtracking:** Basic idea and control structure of backtracking,Permutation & Combination generation, Graph Coloring, N-queen problem, Hamiltonian cycle, Branch and Bound in backtracking. For example in traveling salesman problem.
- **String Matching Algorithms:**Naïve string matching algorithm, Rabin Karp algorithm, String matching with finite automata, Knuth Morris Pratt (KMP) algorithm,Trie Suffix Array.
- **NP Completeness:** Polynomial time, Polynomial time verification, NP-completeness and reducibility, NP-complete problems.

- **Online Algorithms:** Competitive Analysis, Online Paging Problem,Randomized Online Algorithms, Adversary Models, Marker Algorithm,
- **Parallel/Distributed/Multithreaded Algorithms:** The basics of dynamic multithreading, Recursive Fibonacci number computation.

CSE 2206; Microprocessors and Assembly Language

3 Credits, 3 Hours/Week

Introduction to 8-bit, 16-bit, and 32-bit microprocessors: architectures, addressing modes, instruction sets, interrupts, multi-tasking and virtual memory, hardware specifications; Memory interface; Bus interface: ISA, PCI, AGP, PS/2, LPT, and USB; Arithmetic Co-processors, MMX and SIMD technologies; Microcontrollers; Integrating microprocessor with interfacing chips;
Introduction to PLC: Control concept and different types of control, sequential control and PLC, PLC specification, functional description of PLC, Different programming language for PLC.

CSE 2207; Microprocessors and Assembly Language Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on **CSE 2206**

CSE 2208; Software Development with JAVA Lab

1.5 Credits, 3 Hours/Weeks

(Recommended but not limited to the following topics)

Introduction to JAVA and JAVA Development Kit (JDK); Fundamental programming with JAVA; Object Oriented Programming based project development with JAVA; Take appropriate steps to archive all the project goals.

Stat 2209; Probability and Statistical Analysis

3 Credits, 3 Hours/Weeks

Elementary Probability Theory: Terminologies and Classical Definition, Additive and Multiplicative Laws of Probability, Conditional Probability, Bayes Theorem, Joint and Marginal Probabilities. Random Variables, Discrete & Continuous Random Variable, Expectation and Variance, Moments and Moment Generating Function. Determination of Confidence interval.
Probability Distributions: Binomial, Negative binomial, Geometric, Exponential, Poisson & Normal Distributions, Theorems and Properties of The Probability Distribution and Their Applications.
Continuous probability distributions: Bernoulli, Binomial, Geometric, Multinomial, Hypergeometric, and Poisson Special Continuous Distributions - Uniform, Gamma, Exponential, and Beta.
Statistical: Measures of location - Mean, Median, Mode; Measures of Spread/Scale: Spread and Variability, Range, Standard Deviation; Frequency Tables, Histograms, Skewness and Modes, Percentiles and Quartiles, Estimating Percentiles from Histograms, Elementary Sampling Theory, Estimation, Hypothesis Testing. Stochastic processes, Discrete time Markov Chain and continuous time Markov chain, birth death process in queuing.

Fifth Semester

CSE 3101; Computer Peripheral Device and Interfacing

3 Credits, 3 Hours/Week

Microcomputer System Peripherals: Microcomputer Displays, Computer Vision. Disk Data Storage Systems. Disk Controllers and Interfaces, Magnetic Disk Format, Organization and Head Positioning. Optical Disks – Optical Positioning, CD-ROM and DVD Disks. Printer Mechanism and Interfacing. Speech Synthesis. Barcode. Microcomputer hardware, Microcomputer addressing modes and instructions, System development flow chart.

8086 Microprocessors: Introduction to 16 bit microprocessors, 8086/8088 CPU architecture, memory organization, interfacing addressing modes, Instruction set, programming examples, pseudo opcodes, assembler directives.

Interface: Interface Components and Their Characteristics, Microprocessor I/O. Microprocessor Bus Signals. Hardware and Software Interrupt Applications, Embedded systems specifications and modeling, embedded hardware platforms and peripherals;

Digital Interfacing: Programming Parallel Ports and I/O Handshaking. Interfacing Microprocessor to Keyboards, Interfacing to Alphanumeric Displays. SCSI. Serial Interface Principles, Asynchronous and Synchronous, RS232 and EIA-562 Standards.

Analog Interfacing and Control: Op-Amp Characteristics and Circuits, Sensors and Transducers. D/A and A/D Converters – Types Operations, Interfacing and Applications.

PCI, ISA Architectures, Programmable timer; Programmable interrupt controller; DMA controller; Serial communication interface; Interfacing with hard-disk; Printer interface; Barcodes, Barcodes reader and interfacing with them; Sound card and MIDI interface; Introduction to stepper motors and their interfacing; Interfacing with semiconductor power switches - BJT, MOSFET, SCR and Triac, Application of opto-coupler and relays.

CSE 3102; Computer Peripheral Device and Interfacing Lab

1.5 credits, 3 hours/alternative week

Laboratory work based on **CSE 3101**

CSE 3103; Operating Systems

3 Credits, 3 Hours/Week

Introduction: Operating Systems Concept, Computer System Structures, Operating System Structures, Operating System Operations, Protection and Security, Special-Purpose Systems.

Fundamentals of OS: OS Services and Components, Multitasking, Multiprogramming, Time Sharing, Buffering, Spooling.

Process Management: Process Concept, Process Scheduling, Process State, Process Management, interprocess Communication, interaction Between Processes and OS, Communication in Client-Server Systems, Threading, Multithreading, Process Synchronization.

Concurrency Control: Concurrency and Race Conditions, Mutual Exclusion Requirements, Semaphores, Monitors, Classical IPC Problem and Solutions, Dead Locks - Characterization, Detection, Recovery, Avoidance and Prevention.

Memory Management: Memory Partitioning, Swapping, Paging, Segmentation, Virtual Memory - Concepts, Overlays, Demand Paging, Performance of Demand Paging, Page Replacement Algorithm, Allocation Algorithms.

Storage Management: Principles of I/O Hardware, Principles of I/O Software, Secondary Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable Storage Implementation.
File Concept: File Support, Access Methods, Allocation Methods, Directory Systems, File Protection, Free Space Management
Protection & Security *:* Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, The Security Problem, Authentication, One-Time Passwords, Program Threats, System Threats, Threat Monitoring, Encryption, Computer-Security Classification.
Distributed Systems: Types of Distributed Operating System, Communication Protocols, Distributed File Systems, Naming and Transparency, Remote File Access, Stateful Versus Stateless Service, File Replication.
Case Studies: Study of A Representative Operating Systems.

CSE 3104; Operating Systems Lab

1.5 Credit, 3 Hours/Week

Laboratory work based on **CSE 3103**

Or

(Recommended but not limited to the following topics)

- Implementation of System Calls
- Implementation of I/O System Calls
- Simulation of UNIX Commands
- Implementation of FCFS Scheduling
- Implementation of SJF Scheduling
- Implementation of Priority Scheduling
- Implementation of Round Robin Scheduling
- Inter Process Communication Using Shared Memory
- Inter Process Communication Using Message Queues
- Producer – Consumer Problem Using Semaphores
- Memory Management Schemes – I
- Memory Management Schemes – I

CSE 3105; Theory of Computation

3 Credits, 3 Hours/Week

Regular Languages: Finite Automaton, Examples of Finite Automata, Designing Finite automata, Equivalence of NFAs and DFAs, The Regular Operations - Closure under the Regular Operations. Regular Expressions. Equivalence with Finite Automata. Non-Regular Languages - The Pumping Lemma for Regular Languages, Regular Grammar.
Context-FreeLanguages: Formal definition of a Context-Free Grammar (CFG)-Examples of CFGs.Ambiguity, Chomsky Normal Form. Efficient CFG Parsing with CYK Algorithm, Pushdown Automata, Formal Definition of a Pushdown Automaton, Examples of Pushdown Automata, Equivalence with CFG, The Pumping Lemma for Context Free Languages.
Computability Theory: The Church-Turing Thesis. Turing machine, Nondeterministic Turing Machines, Hilbert's problems.

Decidability: Decidable Languages, Halting Problem – Diagonalization Method.
Complexity Theory: The Classes P, NP, Examples of Problems in these Classes. The P Versus NP Question. NP-Completeness, Polynomial Time Reducibility, The Cook-Levin Theorem. Examples of NP-Complete Problems: The Vertex Cover Problem - The Hamiltonian Path Problem - The Subset Sum Problem. Approximation Algorithm, Probabilistic Algorithms.

CSE 3106; Engineering Drawing Lab

1.5 Credits, 3 Hours/Week

Lab based on following contents:

Orthographic projection: Concept of axes, plane and quadrant, Scale drawing, Sectional view, Top and side view Isometric views, Missing line, Auxiliary view, Pictorial views.
Drawing standard and practices: Interpenetrating of surface, Development of surfaces, Machine drawings, and Technical sketching.
Basic Concept of Computer Aided Design (CAD): Project on Engineering Drawing and CAD using Contemporary packages in engineering drawing.

CSE 3107; Compiler Design

3 credits, 3 hours/week

Introduction to Compiler: Compiler Structure, Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool based Approach to Compiler Construction, Complier-Compliers and Translator Writing Systems.
Lexical Analysis: Interface with Input, Parser and Symbol Table, Token, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting, Implementation, Regular Definition, Transition Diagrams, Lex.
Syntax Analysis: CFGs, Ambiguity, Associativity, Precedence, Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing, Bottom Up Parsing, Operator Precedence Grammars, LR Parsers (SLR, LALR, LR), YACC.
Syntax Directed Definitions: Inherited and Synthesized Attributes, Dependency Graph, Evaluation Order, Bottom Up and Top Down Evaluation of Attributes, L- and S-Attributed Definitions.
Type Checking: Type System, Type Expressions, Structural and Name Equivalence of Types, Type Conversion, Overloaded Functions and Operators, Polymorphic Functions.
Run Time System: Storage Organization, Activation Tree, Activation Record, Parameter Passing, Symbol Table, Dynamic Storage Allocation, and Heap Storage Management.
Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls, Implementation Issues.
Code Generation and Instruction Selection: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, Dag Representation of Programs, Code Generation from Dags, Peep Hole Optimization, Code Generator Generators, Specifications of Machine.

CSE 3108; Compiler Design Lab

1.5 credits, 3 hours/alternative week

Laboratory work based on **CSE 3107**

Sco 3109; Sociology and Ethics and Legal Aspects of Information

3 credits, *3 Hours/Week*

Introductory Sociology: Definition, scope, relationship with other disciplines.
Development of sociology: contributions of Augustecomte, Herbert Spencer ; Marx Emile Dufkheim Karl & Max Weber, theoretical perspectives.
Methods & Measures in Sociology: Scientific method, experiments, survey, participant observation, participatory techniques & historical sociology.
Culture, Beliefs &Values: Norms & sanctions, Symbols, language, subculture, counter-culture. Hegemony & resistance
Different Types of Societies: Hunting & gathering societies, horticultural societies, Agrarian societies & industrial societies. Primitive communism, slavery, feudalism, capitalism, socialism &communism.
Social interaction & Social Structure: Socialization: agencies of socialization, socialization & life cycle. Social Interaction, exchange reciprocity, status, role, groups & organizations.
Deviance & Social Control: Definition of deviance, theories of deviance Crime & Justice system; agencies of social control
Social Inequality: Inequality, stratification & class Theories of stratification: Marx, weber, Davis & Moore Gender inequality, age & inequality, social mobility.
Family, Education & religion: Forms & functions of Family, Education of Economic & political system, Religioms Belifs & Rituals.
Population & Environment: Global Economy, Rural society R urbanization.
Dynamics of social life: Collective behavior & social movement. Social change: factors of social change, theories of social change, functionalism, conflict, modernization dependency, world system globalization.
Definition and scopes of Ethics. Different branches of ethics. Social change and the emergence of new technologies. History and development of engineering ethics. Science and technology necessity and application. Study of ethics in engineering. Applied ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients. Attitude of an engineer to other engineers. Measures to be taken in order to improve the quality of engineering profession.
Ethical expectation: Employers and employees, inter-professional relationship, Professional Organization – maintaining a commitment of ethical standards. Desired characteristics of a professional code. Institutionalization of ethical conduct. Definition and scopes of Ethics.
Different branches of ethics. Social change and the emergence of new technologies.
History and development of engineering ethics. Science and technology- necessity and application. Study of ethics in engineering. Applied ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients. Attitude of an engineer to other engineers. Measures to be taken in order to improve the quality of engineering profession. Ethical expectation: Employers and employees, inter-professional relationship, Professional Organization –maintaining a commitment of ethical standards. Desired characteristics of a professional code. Institutionalization of ethical conduct.

Sixth Semester

CSE 3201; Data communication

3 Credits, 3Hours/Week

Introduction: Communication model, data communication tasks, data communication network standards and organizations. Protocol architecture, communications between layers, peer to peer communication between remote layers, service access points, service primitives and communication between adjacent layers, encapsulation of PDUs, addition of headers on transmission; removal on reception, segmentation & reassembly by protocol layers. Physical Layer: Analog and digital data transmission, spectrum and bandwidth, transmission impairments, data rate and channel capacity. Transmission Medium: Characteristics and applications of various types of guided medium. Wireless Transmission: Characteristics and applications of wireless transmission-terrestrial and satellite microwave, radio waves, propagation mechanism, free space propagation, land propagation, path loss, slow fading, fast fading, delay spread, inter symbol interference, VSAT. Digital transmission: Line coding techniques-NRZ, RZ, Manchester, and differential Manchester encoding, AMI, Block coding, analog to digital conversion based on PCM, delta modulation, etc. Analog transmission: ASK, FSK, PSK, QPSK, QAM encodings, AM, PM, FM, etc. Data Transmission: Synchronous and asynchronous data transmission techniques. Multiplexing: FDM, international FDM carrier standards, synchronous TDM, international TDM carrier standards, statistical time division multiplexing. Spread Spectrum: Frequency hopping spread spectrum, direct sequence spread spectrum, code division multiple access. Data Link Layer: Error Detection and Correction; parity check, CRC, forward error correction technique, linear block code, hamming code, etc. Data Link Control: Line configurations, flow control and error control techniques- sliding window, stop and wait ARQ, selective reject ARQ and HDLC protocols.

CSE 3202; Data Communication Lab

1.5 Credit, 3 Hour/week

Laboratory work based on **CSE 3101**

(Recommended but not limited to the following topics)

- To study different types of transmission media
  a. Familiarization with Networking cables (CAT5, UTP), Connectors (RJ45, T-connector), Hubs, Switches. b. Configuration of a HUB/Switch.
- PC-to-PC Communication with the Data Communication Trainers for
  - File Transfer.
  - Error detection codes, Data Encryption etc.
- Experiments using LAN Trainer kit for
  - Point-to-Point Communication
  - Multicast/Broadcast Communication
  - Data Encryption and security protocols
- To make inter-connections in cables for data communication in LAN and install LAN using (a) Tree topology (b) STAR topology (c) Bus topology (d) Token-Ring topology
- Study of MODEMs: (a) configure the modem of a computer (b) Study Serial Interface RS-232 and its applications (c) Study the Parallel Interface and its applications

CSE 3203; Software Engineering

3 Credits, 3 Hours/Week

Introduction: Attributes of Good Software, Professional Software Development, Software Engineering, Software Engineering Diversity, Software Engineering Ethics, Approaches of Software Engineering

Software Processes: Concepts of Software Process Models or Software Development Lifecycle (SDLC), Predictive SDLC, Adaptive SDLC, Waterfall Model, Iterative and Incremental Model, Spiral Model, Prototyping, Agile Model

Feasibility Study: Problem Definition Document (PDD), Format of PDD, Data Flow Diagram (DFD) of a system, Cost of Software Development, Feasibility Study, Operational Feasibility Study, Technical Feasibility Study, Economical Feasibility Study, Feasibility Study Report

Project Management: Project Management Concept, Responsibilities of Project Manager, Risk Management: Risk Identification, Risk Analysis, Risk Planning, Risk Monitoring, Managing People, Motivating People, Teamwork, Selecting Group Members, Group Organization, Group Communication

Project Planning: Project Planning Concept, Software Pricing, Plan-Driven Development, Project Plans, The Planning Process, Project Scheduling, Schedule Representation, Agile Planning, Estimation Techniques

Requirement Engineering: Requirement Engineering Concept, Functional and Non-Functional Requirements, The Software Requirements Document, Requirement Specification, Requirement Engineering Processes, Requirements Elicitation and Analysis, Requirement Discovery, Interviewing, Scenarios, Use Cases, Ethnography, Requirement Validation, Requirement Management

System Modeling: System Modeling Concept, Context Models, Interaction Models, Structural Models, Behavioral Models

Architectural Design: Architectural Design Concept, Architectural Design Decisions, Architectural Views, Architectural Patterns, MVC Architecture, Layered Architecture, Three Tier Architecture, Repository Architecture, Client-Server Architecture, Pipe and Filter Architecture, Application Architecture

Design and Implementation: Design and Implementation concept, Object-Oriented Design using the UML, System Context and Interactions, Object Class Identification, Design Models, Interface Specification

Design Pattern: Concept of Design Pattern, Benefits of Design Patterns, Classification of Design Pattern: Creational Design Pattern, Structural Design Pattern, Behavioral Design Pattern, Concept of Singleton, Factory, Decorator, Adapter, Proxy, Façade, Strategy, Composite and Observer Design Pattern

Software Testing: Concept of Software Testing, Stages of Testing : Development Testing, Release Testing, User Testing.

CSE 3204; Software Engineering Lab

1.5 Credit, 3 Hour/week

Laboratory work based on **CSE 3103**

(Recommended but not limited to the following topics)

1. Preparation of Problem Definition Document for standard application problems in standard format.(e.g Library Management System, Railway Reservation system, Hospital management System, University Admission system)
2. Preparation of Feasibility Report of the system

3. Preparation Project Planning Document
4. Preparation of Software Requirement Specification (SRS) Report
5. Preparation of Design Document using Use Case Diagram, Activity Diagram, Class Diagram and Sequence Diagram
6. Building the System employing Architectural Pattern and Design Pattern
7. Design Test Script/Test Plan(both Black box and White Box approach)

CSE 3205; Artificial Intelligence

3 Credits, 3 Hours/Week

What Is Artificial Intelligence: The AI Problems, The Underlying Assumption, What Is An AI Technique?

Problems, Problem Spaces and Search: Defining TheProblem As A State Space Search, Production System, Problem Characteristics.

Heuristics Search Techniques: Generate and Test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Knowledge Representation Issues: Representation and Mappings, Approaches to Knowledge Representation, Issues In Knowledge Representation.

Using Predicate Logic: Representing Simple Facts In Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution.

Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching.

Game Playing: Overview, The Mimimax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening,

Planning: Overview, An Example Domain: The Blocks World, Components of A Planning System, Goal Stack Planning,

Understanding: What Is Understanding, What Makes Understanding Hard, Understanding As Constraint Satisfaction.

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Expert Systems: Representing and Using Domain Knowledge, Expert System Shells Explanation, Knowledge Acquisition.

AI Programming Language: Python, Prolog, LISP

CSE 3206; Artificial Intelligence Lab

1.5 Credit, 3 Hours/Week

Laboratory work based on **CSE 3105**

(Recommended but not limited to the following topics)

- Implementing basic logic gates in Prolog.
- Implementing human family relation using Prolog
- Implementing monkey-banana problem using Prolog
- Implement the logics for selection process in an interview using Prolog
- Using Dynamic Database using Prolog
- Implement Fibonacci number and m^n value using Lisp.
- Implementation of AND gate with Perceptions.
- Implementation of NOR gate with Perceptions.
- Implementation of XOR gate with Back Propagation Neural Network
- Implementation of Genetic Algorithm, DFS, and BFS.

CSE 3207; Systems Analysis and Design

3 Credits, 3 Hours/Week

System analysis fundamentals: systems, roles, and development methodologies; Understanding and modeling organizational system; Project management; Information requirements analysis: Interactive methods; Information gathering: Unobtrusive methods; agile modeling and prototyping; The analysis process: Using data flow diagrams; Analyzing systems using data dictionaries; Process specifications and structured decisions; Object oriented systems analysis and design using UML; The essentials of design: Designing effective output, Designingeffective input; Designing databases; Human-computer interaction; Designing accurate data entry procedures; Quality assurance and implementation.

CSE 3208; Systems Analysis and Design Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on **CSE 3208**

LGE 3209; Scientific Report Writing Lab

1.5 Credit, 3 Hours/Week

Lab based on following contents:

Technical Report Writing: i) Report Types (Organizational / Commercial / Business / Project) ii) Report Format & Organization of Writing Materials iii) Report Writing(Practice Sessions & Workshops)

Language Laboratory Practice: **I**. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory Practice Sessions. **II)** Conversation Practice Sessions: (To be done as real life interactions) a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed b) Introducing Role Play & honing over all Communicative Competence **III)** Group Discussion Sessions: a) Teaching Strategies of Group Discussion. b) Introducing Different Models & Topics of Group Discussion c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure. Interview Sessions: a) Training students to face Job Interviews confidently and successfully b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication **IV)** Presentation: I)Teaching Presentation as a skill Strategies and Standard Practices of Individual /Group Presentation II)Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids. **V)**Competitive Examination: a) Making the students aware of Provincial /National/International Competitive Examinations b) Strategies/Tactics for success in Competitive Examinations c) SWOT Analysis and its Application in fixing Target.

Gen 3210; Bangladesh Studies

3 Credits, 3 Hours/Week

Introduction: Historical Background of Bangladesh, Ancient Bengal, the Medieval Bengal, Moghal Period, British rule in Bangladesh, Pakistan Period, Emergence of Bangladesh.

Cultural development: Development of Bengali cinema, Drama, Literature movement, Socio cultural development in recent Bangladesh.

Liberation War and Emergence of Bangladesh: Primary stage of liberation, language movement, Declaration of Independence, Freedom fighting, Genocides during Liberation period, Freedom fighters and their contributions for Independence, Birshresto and other award winners during Liberation time, Day of Independence and Bijoy Dibash, Rule of Foreign for Independence of Bangladesh, Legislature, Judiciary system. Structure of activity of government, constitution of Bangladesh, Reconstructions and rehabilitations works, Economic constrains during early days, Rule of Donors to activate country's economic and other development activities.

Geophysical condition: Position of Bangladesh in Global map, Current District and Thana administrations and locations, Rivers in Bangladesh and their importance, flood situation and waterflow system.

Industrial Development: Introduction of Industries, structure of Industries, success and failure history, development of manufacturing sector, export development, developing agencies, Industrial export-import policies of Bangladesh.

Educational Development: Education structure in primitive and present situation, educational policies, crisis of implementation, literacy rate, current situation of educational environment in Bangladesh, human resource development trends and manpower export from Bangladesh, computer literacy.

Rural and Urban Development: Rural situation during early days and latest condition, migration of rural people to urban area, economic and other gaps of rural and urban peoples, rural and urban communications, minimization gaps of rural and urban peoples, sanitation system, health care and education level, economic and manufacturing levels and life style of urban and rural area, religious activities in Bangladesh and the moral values.

Economic activities: Major economic sectors, trends of economic growth, recent development in various sectors, rule agricultural sector, RMG sector, leather sector, frozen foods and other potential sectors in Bangladesh, transport and port facilities.

Seventh Semester

CSE 4101; Project

1 Credit, 2 Hours/Week

To be decided by respective project supervisor/s.

CSE 4102; Computer Networking

3 Credits, 3 Hours/Week

Introduction to Computer Networks. Network Protocol Hierarchies, Overview of OSI and TCP/IP Models; topologies, Medium Access Control Protocols -CSMA/CD, token Ring and FDDI. Data Link Control, HDLC; DLL In Internet; DLL of ATM; LAN Protocols: Standard 802.*, Switches, Hubs and Bridges, FDDI, Fast Ethernet.

Internetworking: Network Interconnection, Routing Algorithms, Multicasting, Flow Control; Congestion Control, Fragmentation, Firewalls Ipv4, Ipv6, ARP, RARP, Mobile IP, Network Layer of ATM. Transport Protocols, Transmission Control Protocol: Connection Management, Transmission Policy UDP. Domain Name System and Name Servers. Distributed Applications: Simple Network Management Protocol, Telnet and FTP, Electronic Mail, I SMTP and MIME, The WWW-Client and Servers, Network Security: Cryptography, DES, IDEA, Public Key Algorithm; Authentication: Digital Signatures.

CSE 4103; Computer Networking Lab

1.5 Credit, 3 Hours/Week

Laboratory work based on CSE 4102

(Recommended but not limited to the following topics)

- Study of Wiring Technology
- Install and Configure Network Cards
- Socket Programming
- Implement Routing Protocols in C and Install and Configure Server
- Install and Configure DHCP & DNS
- Install and Configure Domain Controller
- Install and Configure Web Server and Proxy Server
- Install and Configure Mail Server
- Install and Configure Samba
- Testing and Troubleshoot Internet
- Local Area Networks Design.
- Wide Area Network Design

CSE 4104; Computer Graphics

3 Credits, 3 Hours/Week

Computer Graphics Programming: OpenGL.
Camera Analogy: Viewing, Windowing, Clipping.
Projective Transformation(Ray-tracing): Orthogonal Projection, Perspective Projection, **Vector:** Normal Vector, View Vector **Matrix:** 2D and 3D Rotation and Translation Matrix, **Raster Graphics:** Line Drawing, Anti-aliasing, Polygon Filling Algorithms, **Hidden Surface Removal:** z-buffering, **Lighting and Surface Property:** Diffused Light, Ambient Light, Specular Light, Lighting Models for reflection, refraction and transparency, **Shading:** Flat Shading, Lambert Shading, Phong Shading, **Texture Mapping:** Texture Fundamentals, Texture Blending, **Curves and Surfaces:** Types of Curves, Cubic-Spline, Beta-Spline, NURBS, **Animation:** Real time animation, Hardware for real-time animation, Character Animation, Computer Games, Movies**, Image Formats:** PPM, BMP, Image Based Rendering, **Morphing:** View morphing, Volume Metamorphosis.

CSE 4105; Computer Graphics Lab

1.5 Credit, 3 Hour/Week

Laboratory work based on CSE 4104
(Recommended but not limited to the following topics)

- Draw a wire-cube using slope independent (scan conversion) mid-point line draw algorithm and projection matrix (using glVertex2i0);)
- Draw interactively animated RGB color cube (e.g., mouse dragging based rotating cube).
- Draw interactively animated RGB color cube (e.g., Keyboard controlled based rotating cube).
- Draw animated RGB color cube, where the rotation and translation is calculated using geometric transformation matrices.
- Draw a solid sphere(s), where different type of illumination / reflection property is controlled by keyboard.
- Draw a solid sphere(s), where position of point light source is controlled by mouse motion.
- Draw a texture mapped solid cube (each face is mapped with different textures).
- Draw animated circle(s) using (scan conversion) mid-point circle draw algorithm (e.g., slowly moving from left to right).
- Draw animated ellipse(s) using (scan conversion) mid-point circle draw algorithm (e.g., slowly moving from left to right).
- Draw a texture mapped solid sphere(s).
- Draw a wheel using slope independent (scan conversion) mid-point line draw algorithm and mid-point circle draw algorithm.
- Draw an animated, ball dropping on a floor (apply effect of gravity on the ball).

CSE 4106; Financial, Cost and Managerial Accounting

2 Credits, 2 Hours/Week

Financial Accounting: Definition, Accounting concepts & Conventions, GAAP, Bookkeeping & Accounting ,Accounting Cycle, Transactions, Double Entry System, Accounting Equation, Journal, Ledger, Trial Balance ,Adjusting Entry, Financial Statement, analysis of Financial Statement.

Cost Accounting: Introduction, Methods & techniques, Cost Classification, Statement of Cost, Overhead allocation, Store Ledger.

Managerial Accounting: Introduction, CVP Analysis (Meaning, Break-Even analysis, contribution margin technique), Relevant Cost analysis.

CSE 4107; Industrial Attachment

2 Credits, 3 Hours/Week

Purpose:

- To develop the practical and communication skills/competencies of students
- To provide real life experience in the industry of
- Computer Science and Engineering
- To strengthen industrial-institutional partnership
- To develop students personality and understanding of individuals
- To be able to work in group or team.
- To provide students background information and experience in career choice.

Performance Assessment:

A formal and final performance assessment is expected to be carried out on the basis of the learning outcomes.

Students are required to give a presentation and a report on:

− Organization structure of the host company/Organization

− Operational practice with in the organization

− Things they have learned

Eight Semester

CSE 4201; Project / Thesis

3 Credits, 5 Hours/Week

To be decided by respective project supervisor/s.

CSE 4202; Engineering Management

2 Credits, 2 Hours/Week

Management: Definition, Evolution, Functions, levels, Principles, Roles of a Manager, Applications & Scope of Engineering Management, MBO, Different schools of Thoughts, Management Vs. Administration.

Organization: Definition, Principles, Organization structure, Organization design & Factors affecting Organization design, Organization Chart, Span of control &Factors affecting Span of control, Formal Organization Vs. Informal Organization, Authority & Responsibility.

Planning & Controlling: Planning (Definition, Nature, Types, Steps), Controlling (Definition, Steps, Techniques).

Leadership: Definition, Features, Leader Vs. Manager, Ingredients of Leadership, Traits of Charismatic Leader.

Motivation: Definition, Need-Want-Satisfaction chain, Theories of Motivation.

Human Resources Management Process: Selection, Recruitment, training, Development, Job Evaluation & Enrichment, Merit Rating.

Industrial Law: Provisions regarding Health, Safety, Welfare, Payment of wages, Trade Union, CBA.

Material Handling & Maintenance: Material Management, Types of inventory, Material Requirement Planning (MRP), Types& Objectives of Maintenance, Considerations in Preventive Maintenance.

Technology Management: Management of innovation and changes; Technology life cycle.

CSE 4203; Digital Systems Design

3 Credits, 3 Hours/Week

Register transfer logic, Hardware description language, inter register transfer, bus transfer, memory transfer, micro operations and macro operations, design of bus systems, representation of digital data in registers and memory, design of a simple computer.

Processor organization, design of arithmetic logic unit (ALU), status register, design of shifter, design of processor unit, design of accumulator.

Control Logic Design, Control organization, Design of hardwire and software control, Micro-program sequencer.

Computer Design with a given System configuration: Instruction set, Programming, Fetch cycle, Execution cycle, Design of computer registers, Design of control, Bus buffer and memory cycle of microcomputers.

Design of memory subsystem using SRAM and DRAM. Design of various I/O devices and systems. Design special purpose controllers.

CSE 4204; Digital Systems Design Lab

1.5 Credits, 3 Hours/Week

Laboratory work based on CSE 4203

CSE 4205; Information Security

3 Credits, 3 Hours/Week

Concept and applications of cryptography; Techniques of designing efficient Cryptosystems: Symmetric key encryption-Stream ciphers, Block ciphers; Message authentication codes; Hash function; Digital signature; Asymmetric key encryption- Diffie-Hellman protocol, Trapdoor functions, RSA, Merkel puzzles, El-Gammal cryptosystems; Linear and differential cryptanalysis; Mathematics of cryptography; Steganography.

Fundamental properties and terminology of information security; System security management, analysis and control; Physical and logical security; Types of attacks; Database security; Network security threats; WSN security; Cloud security; Computer abuse; Legal and Ethical issues.

List of CSE Optional Courses: CSE Option-I

CSE 5101; Optical Fiber Communications

3 Credits, 3 Hours/Week

Nature of Light, Optics; Optical Fiber Mode, Single Mode Fiber, Graded index Structure. Signal Degradation in Optical Fibers: Attenuation, Signal Distortion, Pulse Broadening Mode Coupling.

Optical Sources: LED, Laser Diodes, Light Source Linearity Modal Partition and Reflection Noise.

Power Launching and Coupling: Source to Fiber Power Launching, Launching Scheme, Fiber to Fiber Joints, Splicing Fiber Connectors.

Photo Detectors: Basic Principle, Photo Detectors Noise, Response Time, Avalanche Multiplication Noise. Optical Receiver Operation: Receiver Configuration, Digital Receiver Performance Preamplifiers.

Digital Transmission System: Point to Point Link, Line Coding, Eye Pattern, System Performance.

Advanced Systems and Techniques: WDM, Local Area Networks, Optical Amplifier, Photonic Switching.

CSE 5102; Soft Computing

3 Credits, 3 Hours/Week

Introduction: Introduction to soft computing; introduction to fuzzy sets and fuzzy logic systems; introduction to biological and artificial neural network; introduction to Genetic Algorithm.

Fuzzy sets and Fuzzy logic systems: Classical Sets and Fuzzy Sets and Fuzzy relations : Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets, cardinality, operations, and properties of fuzzy relations.

Membership functions : Features of membership functions, standard forms and boundaries, different fuzzification methods.

Fuzzy to Crisp conversions: Lambda Cuts for fuzzy sets, fuzzy Relations, Defuzzification methods. Classical Logic and Fuzzy Logic: Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication.

Fuzzy Rule based Systems: Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System-Mamdani Fuzzy Models – Sugeno Fuzzy Models. Applications of Fuzzy Logic: How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting.

Neural Network: Introduction to Neural Networks: Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron.

Learning Methods : Hebbian, competitive, Boltzmanetc.

Neural Network models: Perceptron, Adaline and Madaline networks; single layer network; Back-propagation and multi layernetworks.

Competitive learning networks: Kohonenself organizing networks, Hebbian learning; Hopfield Networks. Neuo-Fuzzy modelling: Applications of Neural Networks: Pattern Recognition and classification.

Genetic Algorithms: Simple GA, crossover and mutation, Multi-objective Genetic Algorithm (MOGA). Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).

CSE 5103; E-Commerce

3 Credits, 3 Hours/Week

From Business to E-Business: E-Commerce Vs. E-Business, B2B Vs B2C, Business Models, Community Building, Auctions and E-Cards. Starting Site: Distributed Applications, Software Requirements,

Building The Object Model: Components and Framework. Structuring Online Store: Design, Maintenance and Administration. Checkout. Order Processing: Building Pipeline, Creating Extranet,

Security and Authentication: Credit Card Authorization, Finalizing and Canceling An Order. Secure Communications: Cryptography, Obtaining A Certificate. Hosting, Development and Deployment: Privacy Statements, Guidelines, Protection. Customer Services. Search tool.

Integration with Other Systems: XML. WAP and Immerging Technologies; Products and Services; Cell Phone, PDA and Other Handheld Devices. Marketing: Tracking Success, Search Engines, Banner Advertising, Other Marketing Opportunities.

E-Governance: Governance Via Information Systems. Opportunities and Technical Challenges. Appropriate Technologies. E-Governance In Practice: Case Studies; Pitfalls.

CSE 5104; Robotics

3 Credits, 3 Hours/Week

Basics: Introduction, Recursive State Estimation, Gaussian Filters, Nonparametric Filters, Robot Motion, Robot Perception.

Localization: Mobile Robot Localization: Markov and Gaussian, Mobile Robot Localization: Grid and Monte Carlo .

Mapping: Occupancy Grid Mapping, TheGraphslam Algorithm, The Fastslam Algorithm.

Planning and Control: Markov Decision Processes.

Social Robots (Sociable Creatures): Historical Backgrounds (Cognitive Robotics), Cognitive Science (Situated Cognition, Embodied Cognition, Ecological Approach,Socio-Cultural Approach), Studies In Social Interaction (Ethno Methodologies, Conversation Analysis), Survey of Socially Interactive Robots, Designing Sociable Robots,, Human-Dependent Robots, Interactive Robots In Autism Therapy.

CSE 5105; Natural Language Processing

3 Credits, 3 Hours/Week

Introduction, Word Modeling, Automata and Linguistics, Statistical Approaches and Part of Speech Tagging, Hidden Markov Models, Vitebri Algorithm, Linguistics and Grammars, Probabilistic Context Free Grammars, Parsing Algorithms and The Lexicon, Semantic, Feature Parsing, Tree Banks and Probabilistic Parsing; Machine Translation, Unsupervised Language Discovery, topic Models and Language in Social Networks, Evolutionary Models of Language Learning and Origins.

CSE 5106; Computer Vision

3 Credits, 3 Hours/Week

Introduction: Introduction to Computer Vision, Face Recognition

Image Structure: Linear Filters, Finding Lines: From Detection to Model Fitting, Clustering and Segmentation.

Camera Models: Camera Models, Camera Calibration, Epipolar Geometry, Stereo and Multi-View Reconstruction,

Recognition: Building Blocks: Detectors and Descriptors, Shift and Single Object Recognition, Optical Flow and Tracking,

Recognition: Objects, Scenes, Activities: Introduction to Object Recognition and Bag of Words Model, Object Classification and Detection (Generative and Discriminative Model), Human Motion Recognition.

CSE 5107; Object Oriented Analysis and Design

3 Credits, 3 Hours/Week

Life-Cycle and Tasks for OO Software Development.
Software Development Methodology: Engineering Or Invention, Example Artifacts Using UML.
Analysis: OO Analysis Landscape, Unified Approach, Reuse and Domain Analysis Process, Components of Analysis Model; OO Analysis : Use-Cases, Class Responsibility Collaborator Modeling, Structures and Hierarchies, Defining Subjects and Subsystems; Object Relational Model, Object Behavior Model : Event Identification with Use Cases, State Representations.
Design Issues for OO Systems: Unified Approach, Partitioning The Model, User, Data and Resource Management Component, Task Management Component, Subsystem Communications; Object Design: Object Descriptions, Program Components and Interfaces;
Design Patterns: Describing and Using A Design Patterns. Creational, Structural and Behavioral Patterns. Examples of Every Pattern In Each Category.
UML Notations and Diagrams to Be Employed Throughout The Course.

CSE 5108; Bio-Informatics

3 Credits, 3 Hours/Week

Molecular biology basics: DNA, RNA, genes, and proteins; Genomere arrangements; DNA sequence alignments; Gene prediction; Dynamic Programming, Local and Global Alignment; DNA sequencing, genome sequencing, protein sequencing, spectrum graphs; Combinatorial pattern matching: Database Search, Rapid String Matching, BLAST, FASTA; Genome Assembly: Consensus-alignment-overlap, Graph-based assembly; Expression Analysis, Clustering and classification; Evolutionary trees and Phylogenetic; Statistical and machine Learning Methods in Bioinformatics.

CSE 5109; Data Warehouse Systems
3 Credits, 3 Hours/Week

Review of Database Concepts: Database design, Conceptual, logical, and physical database design.
Data warehouse (DW) Concepts: Business Intelligence, Multidimensional Model, OLAP, OLAP operations, DW architecture, DW design overview.
Conceptual DW Design: Conceptual modeling of DW, Advanced hierarchies, Source driven and data driven DW design method.
Logical DW Design: Logical modeling of DW, Relational DW design, Relational implementation of the conceptual model, Time dimension, Logical representation of hierarchies, Slowlychanging dimensions. Data cube operations.
Querying DW: MDX query, SQL query, Comparison of MDX and SQL query, OLAP tools.
Physical DW design: Physical modeling of DW, Materialized views, Data cube maintenance.
Extraction, Transformation, and Loading (ETL): Business process modelling notation (BPMN), Conceptual ETL design using BPMN, Integration services and PDI (Kettle).
Exploratory OLAP: DW and the Semantic Web (SW), SPARQL, RDF representation of multidimensional data, RDF QB vocabulary, QB4OLAP vocabulary, SETL tool.

CSE 5110; Management Information Systems
3 Credits, 3 Hours/Week

Introduction to Management Information System and Strategic Information System, Hardware and Software Evaluation In Business Environment, Introduction to Telecommunication and Database, End-User Computing, Decision Support System, Information Reporting System, and Executive Information System: Business System Design, Information Ethics and Other Related Issues.

CSE 5111; Special Topics Related to CSE
3 Credits, 3 Hours/Week

CSE 5112; Lab of Selected Topic / Lab of Special Topics related CSE
1.5 Credits, 3 Hours/Week

List of CSE Optional Courses: CSE Option-II

CSE 5201; Mobile Computing
3 Credits, 3 Hours/Week

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL):Introduction to WLL Architecture, wireless Local Loop Technologies.
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.
Server-side programming in Java, Pervasive web application architecture, Device independent example application

CSE 5202; Geographical Information Systems
3 Credits, 3 Hours/Week

Introduction: Terminology; Computer assisted Cartography, Remote Sensing, Photogrammetry and Land Information Systems; Geographical Data; GIS Data Capture; GIS Displays Etc.

Spatial Analysis and Cartographic Concepts: Points, Lines, Areas and Surfaces; Nominal, Ordinal, Interval and Ratio Attributes; Socio-Economic Versus Resource and Physical Data; Georeferencing; Geocodes Etc; Map Projections and Transformations, Their Properties; Co-Ordinate Transformations In 2D and 3D; Fundamental Spatial Concepts: The Quality of Spatial Data: Scale: Accuracy, Precision and Time; Basic Spatial Operations On Lines, Areas and Surfaces. The Object/Layer Debate.

Technical aspects of GIS: Relationship Between GIS and Other Information Systems; Data Models for Spatial Data: Arcs, Polygons, topological Data Structures, Polygon Building; Data Capture Devices, Digitising and Scanning Techniques – State of The Art; Special Environment for GIS; Issues of Display, Hard V. Virtual, Vector V. Raster, Data Resolution; Graphics Output Design Issues: Odes of Use/GIS Interaction; Temporal and 3D Representation; Line Generalizations; Use and Function of The Global Positioning System (GPS) In GIS.

The Application of Geographical Information Systems: Purpose and Users of GIS, Public Utilities, Resources Analysis, Urban Planning and Decision Support. Global Scale Applications: International Initiatives; Global Data Capture and Referencing. GIS In Practice, Map Analysis, Spatial Data Searches Etc. Cost and Benefits of GIS. GIS and Global Science. GIS and Spatial Cognition. Knowledge Based Techniques In GIS.

CSE 5203; Parallel Computing
3 Credits, 3 Hours/Week

Introduction.-Parallel Processing Environment- Pipelining and Data Parallelism, Scalability, Flynn‟s Taxonomy,. (3L) Parallel Processing organization- Mesh, Hyper-tree, Pyramid, Butterfly, Hypercube network. Parallel Algorithms –Structure, cost, Analysis; Elementary Algorithms: Broadcast, Prefix sums, All sums Algorithms on Selection problem, Merging-Odd-even merging network, CREW Merging, N-ary searching. Matrix Transposition ,Matrix Multiplications- 2D Mesh SIMD ,Hypercube SIMD, Shuffle-Exchange SIMD models. Discrete Fourier Transform, Fast Fourier Transform.
Linear system of equations- Gaussian Elimination, Gauss-Seidel algorithm, Jacobi algorithm, Sorting – Enumeration sort, Odd-even transposition sort, Bitonic merge Ellis‟s Algorithm.Graph Algorithms, Spanning Tree Algorithms, Parallel Programming Languages –FORTRAN 90, OCCAM

CSE5204; VLSI Design
3 Credits, 3 Hours/Week

VLSI Design Methodology:top-Down Design Approach, Technology Trends. NMOS, CMOS Inverters, Pass Transistor and Pass Gates: Dc and Transient Characteristics. Brief Overview of Fabrication Process: NMOS, CMOS, Bi-CMOS Process. NMOS and CMOS Layout, Stick Diagram and Design Rules. CMOS Circuit Characteristics and Performance Estimation: Resistance and Capacitance, Rise and Fall Time, Power Estimation. Buffer Circuit Design. Introduction to Bi-CMOS Circuits.
Complex CMOS Gates. CMOS Building Block: Multiplexer, Barrel Shifter, Adder, Counter, Multipliers. Data Path and Memory Structures. Design Style: FPGA and Plds.
Introduction to HDL: Basic Digital Design Using VHDL.

CSE 5205 Human Computer Interaction
3 Credits, 3 Hours/Week

Introduction to Human-computer interaction (HCI), human information processing systems, Models of interaction, Approaches to HCI ; User interface development: iterative design, rapid prototyping, low fidelity interactive prototyping, comparative evaluation of multiple interfaces, evaluation of user interface, heuristic evaluation; UI design models: system model, interface model, user model; Usability: consistency, simplicity, learnability, efficiency, safety, ergonomics, aesthetics; Accessibility: kinds of impairments, assistive technology, universal design, accessibility APIs; Internationalization and Localization: translation, text direction, sort order, formatting, color conventions, icons; User research methods: experiments, experiment design techniques, field study, survey; Multimodal signal processing: recognize human emotions through combination of spoken language, gestures, facial expressions; Case studies.

CSE 5206; Graph Theory

3 Credits, 3 Hours/Week

Graphs and Simple Graphs, Digraphs, Subgraphs, Vertex-Degrees, Walks, Paths and Cycles; Trees, Spanning Trees In Graphs, Distance In Graphs; Complementary Graphs, Cut-Vertices, Bridges and Blocks, K-Connected Graphs; Euler tours, Hamiltonian Cycles, Chinese Postman Problem, Traveling Salesman Problem; Matching and Factors, Network Flow Problems Chromatic Number, Chromatic Polynomials, Chromatic Index, Vizing"s Theorem, Planar Graphs, Perfect Graphs.

CSE 5207; Multimedia Systems

3 Credits, 3 Hours/Week

Overview to Multimedia Systems, Multimedia Storage, Data Compression Techniques for Audio and Video, Synchronization, Multimedia Networking and Protocols, QOS Principles, Video Streams On ATM, Mobile Multimedia Communications, Operating System Support for Multimedia, Hypermedia System, Standards for Multimedia, Multimedia Database and Multimedia Applications.

CSE 5208; Digital Signal Processing

3 Credits, 3 Hours/Week

Discrete-time signals:

Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences – periodic, energy, power, unit-sample, unit-step, unit-ramp, real & complex exponentials, arithmetic operations on sequences.

LTI Systems:

Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercises, properties of convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems.

Z-Transform:

Definition, mapping between s-plane and z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples and exercises, characteristic families of signals along with ROCs, convolution, correlation and multiplication using Z-transform, initial value theorem, Perseval"s relation, inverse Z-transform by contour integration, power series & partial-fraction expansions with examples and exercises.

Discrete Fourier Transform:

Concept and relations for DFT/IDFT, Twiddle factors and their properties, computational burden on direct DFT, DFT/IDFT as linear transformations, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circular convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT, aliasing error, filtering of long data sequences – Overlap-Save and Overlap-Add methods with examples and exercises.

Fast Fourier Transform:

Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithms, signal flow graphs, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises.

Filter Design:

Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transforms, design of linear phase FIR filters, no. of taps, rectangular, Hamming and Blackman windows.

Digital Signal Processor:

Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programs in Assembly Language.

FPGA:

Architecture, different sub-systems, design flow for DSP system design, mapping of DSP algorithms onto FPGA.

CSE 5209; Digital Image Processing

3 Credits, 3 Hours/Week

Introduction to image processing, Differences between image processing, image analysis, and computer vision, Image Representation, Color Space, Image Sampling and Quantization, Image Quality Measurement, Image Quality Enhancement: Intensity transformations, Contrast stretching, Histogram equalization, Spatial domain filtering - mean and median filters, Sharpening filters - Laplacian and Sobel, Discrete Fourier Transform, Frequency-Domain Filtering - Gaussian and Butterworth low pass and High pass filters, Image Transform - Discrete Cosine Transform, Wavelet transform, Mutiresolution Anallysis and Discrete Wavelet Transform, Introduction to Image Restoration - Noise models, spatial and frequency filters, Weiner filter, Morphological Image Processing, Image Feature Extraction and Representation: Edge and Line, Region Segmentation and Representation, Image and Video Compression.

CSE 5210; Special Topics Related to CSE

3 Credits, 3 Hours/Week

CSE 5211; Lab of Selected Topic / Lab of Special Topics Related to CSE

1.5 Credits, 3 Hours/Week