CURRICULUM

DIPLOMA

Information Technology

(Three year program-semester system)

Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

Developed in 2008

First Revision, 2016

Table of Content

1. Introduction:

Information Technology (IT) is emerging field in the engineering and technology sector. Many people in the developed countries, developing countries and under developed countries have been given emphasis for the broader application of Information and Communication Technology (ICT). This field has been helping the world for the socio-economic development and it has been creating jobs opportunities both in public and private sectors as well as has been creating self-employment opportunities immensely. IT jobs are the top most earning job on global market and knowledge base industries are the new destination of economic growth.

This curriculum is designed with the purpose of producing middle level technical workforce equipped with knowledge and skills related to the areas of IT so as to meet the demand of such workforce in the country to contribute in the national streamline of poverty reduction of our country Nepal. This skills and knowledge included in this curriculum will be successful to deliver the individual needs and the needs in the field of IT.

2. Curriculum title:

Diploma in Information Technology (DIT)

3. Objectives:

This curriculum has the following objectives:
- To produce middle level competent technical workforce/human resources that could provide services to the public and private organizations in the field of IT.
- To prepare such technicians who are able to work in public and private organizations in general communication, banking and business sectors in particular.
- To prepare such technical workforce who will demonstrate positive attitude and respect for the profession and socio-cultural values.
- To help in meeting the demand of such technical workforce required for the public and private organizations of Nepal.
- To reduce the dependence on employing such technicians from foreign countries.
- To create self-employment opportunities immensely.

4. Program description:

This course is based on the job required to perform by the information related technician at different related industries and organizations in Nepal. Therefore, this curriculum is designed to provide knowledge and skills focusing on Information Technology related to the occupation. The Diploma in Information Technology program extends over three years. Each year is divided into two semesters. There are six semesters in total within the period of three years. The first year course focuses on foundational subjects; the second year course focuses on basic disciplinary subjects of Information

Technology. Similarly, the third year comprises of the disciplinary subjects including electives. Moreover, the third year focuses on the application of learned skills and knowledge as the minor and major projects.

The foundation subjects like Physics, Chemistry, and Mathematics are included and which are applicable in the field of Information Technology. It also includes language subjects like Nepali and English applicable for the communication in the same area. The disciplinary subjects are offered in this program in all semesters. It makes provision of major and minor projects as well as elective subjects in the specific areas of IT. In short, this curriculum will guide its implementers to produce competent and highly employable middle level technical workforce in the field of information technology.

The contents of individual subjects prescribed in the curriculum are incorporated in the light of "must to know and must to do" principle of knowledge and skills for this level.

5. Duration:

The total duration of this program is three years. Each year consists of two semesters of six months. Moreover, one semester consists of 19.5 academic weeks including the evaluation period. Actual teaching learning hours will be not less than 15 weeks in each semester. There is a provision of back paper; however, students must pass all the subjects of all six semesters within six years from the date of enrolment.

6. Group size:

The group size is maximum 48 (Forty eight) students in a batch.

7. Entry criteria:

- SLC or equivalent with English, Science and Mathematics or related TSLC or as per CTEVT rules
- Should pass entrance examination as administered by CTEVT

8. Medium of instruction:

The medium of instruction is in English and/or Nepali.

9. Pattern of attendance:

Minimum 90% of attendance in each subject is required to appear in the respective final examination.

10. Teacher and student ratio:

- For theory: As per the nature of the course.
- For practical / demonstration: 1:12
- For bench work: 1:8

11. Teachers and demonstrators:

- The disciplinary subject related teacher should be at least the bachelor's degree holder in the related area with three years' experience in the related field.
- The demonstrators should be at least the bachelor's degree holder in the related area with two years experiences in training activities.
- The foundational subjects' related teachers (refer to course code SH and MG) should be at least the master's degree holders in the related areas.

12. Mode of education:

There is a both inductive and deductive mode of education.

13. Instructional media and materials:

The following instructional media and materials are suggested for the effective instructions and demonstration.

- *Printed Media Materials* (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packages, Procedure sheets, Performance Check lists, Textbooks etc.).
- *Non-projected Media Materials* Display, Models, Flip chart, Poster, Writing board etc.).
- *Projected Media Materials* (Opaque projections, Overhead transparencies, Slides etc.).
- *Audio-Visual Materials* (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- *Computer-Based Instructional Materials* (Computer-based training, Interactive video, simulation, virtual lab, e-Library etc.).

14. Teaching learning methodologies:

- Theory: Lecture, Discussion, Seminar, Interaction, Assignment, Group work.
- Practical: Demonstration, Observation, Guided practice, Self-practice, Project work, Industries practice, field visit.

15. Examination and marking scheme:

- The subject teacher internally assesses the students' achievement in each subject during the course followed by a final examination at the end of each semester.
- A weightage of 20% for the internal assessment and 80% for the semester final examination will be allocated for theoretical components of a subject.
- The final semester examinations of all theory components will be conducted through written tests.
- Generally the method of continuous assessment will be adopted for practical components.

- In some cases semester final examinations are also conducted for practical components as per the needs.
- The student who fails in the internal assessment will not be allowed to sit in the semester final examination.

16. Disciplinary and ethical requirements:
- Intoxication, insubordination or rudeness to peers will result in immediate suspension followed by review by the disciplinary review committee of the institute.
- Dishonesty in academic or practice activities will result in immediate suspension followed by administrative review, with possible expulsion.
- Illicit drug use, bearing arms at institute, threats or assaults to peers, faculty or staff will result in immediate suspension, followed by administrative review with possible expulsion.

17. Pass marks:
The students must secure minimum 40% marks both in theory and practical (lab). Moreover, the students must secure minimum40% marks in the internal assessment and 40% in the final semester examination of each subject to pass all subjects offered in each semester.

18. Grading system:
The overall achievement of each student will be measured by a final aggregate percentage of all final semester examinations and graded as follow;

- Distinction   :   > or =80 %
- First division   :   65 % to < 80 %
- Second division   :   50 % to 65 %
- Pass   :   40 % to < 50 %

19. Certification and degree awards:
- Students who have passed all the components of all subjects of all six semesters are considered to have successfully completed the course.
- Students who have successfully completed the course will be awarded with a degree of **Diploma in Information Technology**.
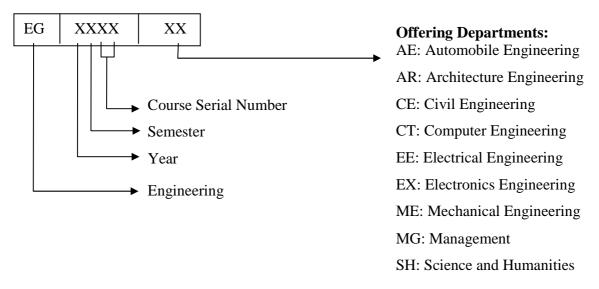
20. Career path:
The graduates will be eligible for the position equivalent to non-gazetted 1st class (technical) as IT technician or as prescribed by the public service commission of Nepal. The graduate will be eligible for registration with the related council in the grade as mentioned in the related council act (if any).

21. Curriculum and credits:

In this curriculum each subject has its code; full marks; and class hours divided into lecture hours, tutorial hours, and practical hours.

22. Subjects codes

Each subject is coded with a unique number preceded and followed by certain letters as mentioned in the following chart:

EG	XXXX	XX

→ Course Serial Number

→ Semester

→ Year

→ Engineering

Offering Departments:

AE: Automobile Engineering

AR: Architecture Engineering

CE: Civil Engineering

CT: Computer Engineering

EE: Electrical Engineering

EX: Electronics Engineering

ME: Mechanical Engineering

MG: Management

SH: Science and Humanities

23. Provision of elective subjects:

There will be no provision of specializing but some subjects are offered here as the elective subjects; viz Elective I: Geographical Information System, Cloud Computing, Management Information System, and Data Mining and for Elective II: Big Data, E-commerce, Mobile Application and Telecommunication.

Curriculum Structure of Diploma in Information Technology

S N	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs.	Total Marks	Remark
1	EG1101SH	Communication Nepali	2				2	10	40	1.5				50	
2	EG1102SH	Communication English	2				2	10	40	1.5				50	
3	EG1103SH	Engineering Mathematics I	4	1			5	20	80	3				100	
4	EG1104SH	Engineering Physics I	3	1		2	6	20	60	3	10	10	1.5	100	
5	EG1105SH	Engineering Chemistry I	3	1		2	6	20	60	3	10	10	1.5	100	
6	EG1106ME	Engineering Drawing			4		4	0	0		60	40	4	100	
7	EG1110CT	IT Fundamentals	3	1		3	7	20	80	3	30	20	3	150	
8	EG1111CT	C Programming	3	1		4	8	20	80	3	30	20	3	150	
		Total	**20**	**5**	**4**	**11**	**40**	**120**	**440**		**140**	**100**		**800**	

S N	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs.	Total Marks	Remark
1	EG1201SH	Engineering Mathematics II	3	1			4	20	80	3				100	
2	EG1202SH	Engineering Physics II	3	1		2	6	20	60	3	10	10	1.5	100	
3	EG1203 SH	Engineering Chemistry II	3	1		2	6	20	60	3	10	10	1.5	100	
4	EG1210 CT	Digital Logic	3			3	6	20	80	3	30	20	3	150	
5	EG1211CT	Object Oriented Programming in C ++	3			3	6	20	80	3	30	20	3	150	
6	EG1216 EE	Electrical Engineering	3			3	6	20	80	3	30	20	3	150	
7	EG1212CT	Web Technology I	3			3	6	20	80	3	30	20	3	150	
		Total =	**21**	**3**		**16**	**40**	**140**	**520**		**140**	**100**		**900**	

Curriculum Structure of Diploma in Information Technology

Year: II   **Part: I**

SN	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs.	Total Marks	Remark
1	EG 2104 SH	Engineering Mathematics III	3	1			4	20	80	3				**100**	
2	EG 2112 CT	Data Structure & Algorithm	3	1		3	7	20	80	3	30	20	3	**150**	
3	EG 2111 EX	Microprocessors	3	1	3		7	20	80	3	30	20	3	**150**	
4	EG 2112 EX	Electronic Devices & Circuits	4	1		3	8	20	80	3	30	20	3	**150**	
5	EG2113 CT	Database Management System	3		3		6	20	80	3	30	20	3	**150**	
6	EG 2114CT	Computer Architecture	4		3		7	20	80	3	30	20	3	**150**	
			20	**4**	**9**	**6**	**39**	**120**	**480**		**150**	**100**		**850**	

Year: II   **Part: II**

SN	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs.	Total Marks	Remark
1	EG 2213 EX	Communication System	4	1		3	8	20	80	3	30	20	3	**150**	
2	EG 2207 CT	Operating System	4			2	6	20	80	3	25			**125**	
3	EG 2208 SH	Statistics & Probability	3	1			4	20	80	3				**100**	
4	EG 2208 CT	System Analysis & Design	4		3		7	20	80	3	25			**125**	
5	EG 2209CT	Java Programming	4			3	7	20	80	3	30	20	3	**150**	
6	EG 2210 CT	Web Technology II	4			3	7	20	80	3	30	20	3	**150**	
		Total	**23**	**2**	**3**	**11**	**39**	**120**	**480**		**140**	**60**		**800**	

Curriculum Structure of Diploma in Information Technology

SN	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs.	Total Marks	Remark
1	EG 3109 CT	Computer Networks	3		3		6	20	80	3	25			**125**	
2	EG 3110 CT	Computer Graphics	3		3		6	20	80	3	30	20	3	**150**	
3	EG 3111 CT	Visual Programming	3			3	6	20	80	3	30	20	3	**150**	
4	EG 3112 CT	Software Engineering	3			2	5	20	80	3	25			**125**	
5	EG 3113 CT	PC Troubleshoot & Maintenance	3			4	7	20	80	3	30	20	3	**150**	
6	EG 3114 CT	Elective-I	3	1		3	7	20	80	3	30	20	3	**150**	
		(a) Geographical Information System (GIS)													
		(b) Cloud Computing													
		(c) Management Information System													
		(d) Data Mining													
7	EG 3115 CT	Minor Project			3		3				30	20	3	**50**	
		Total	**18**	**1**	**9**	**12**	**40**	**120**	**480**		**200**	**100**		**900**	

SN	Course Code	Course Title	L	T	P	Lab	Total Hour	Theory Asst. Marks	Theory Final Marks	Theory Time Hours	Practical Asst. Marks	Practical Mark Final	Practical Time Hrs	Total Marks	Remark
1	EG 3208CT	Multimedia Technology	3	1		3	7	20	80	3	25			**125**	
2	EG 3209 CT	Network and System Administration	3			3	6	20	80	3	25			**125**	
3	EG 3201MG	Entrepreneurship Development	3		2		5	20	80	3	25			**125**	
4	EG 3202 SH	Technical English	3				3	10	40	1.5	25			**75**	
5	EG 3210 CT	Elective-II	3	1		3	7	20	80	3	30	20	3	**150**	
		(a) Big Data													
		(b) E-commerce													
		(c) Mobile Application Development													
		(d) Telecommunication													
6	EG 3211 CT	Cyber Security and Social Ethics	3				3	10	40	1.5				**50**	
7	EG 3212 CT	Major Project			8		8				120	80		**200**	
		Total	**18**	**2**	**10**	**9**	**39**	**100**	**400**		**250**	**100**		**850**	

First Year (First Semester)

First Semester
<u>Subjects:</u>

1. **EG 1101 SH   Communication Nepali**
2. **EG 1102 SH   Communication English**
3. **EG 1103 SH   Engineering Mathematics I**
4. **EG 1104 SH   Engineering Physics I**
5. **EG 1105 SH   Engineering Chemistry I**
6. **EG 1106 ME   Engineering Drawing**
7. **EG 1110 CT   IT Fundamentals**
8. **EG1111 CT   C Programming**

कम्युनिकेसन नेपाली

ई.जी. ११०१ एस.एच.

वर्ष : प्रथम
सेमेष्टरःप्रथम

जम्माः २ घण्टा/ हप्ता
प्रवचनः २ घण्टा/ हप्ता
पूर्णाक : ५०

कोर्षको परिचय

यस विषयमा विद्यार्थीहरूले भावी व्यवसायमा प्रभावकारी ढङ्गले सञ्चार गर्नका लागि आवश्यक पर्ने ज्ञान र सीपसँग सम्बन्धित नेपाली सञ्चारात्मक भाषा, लेखन सीप, र कृति परिचयको ढाँचा गरी जम्मा ३ वटा एकाईहरू सभावेश गरिएका छन् ।

कोर्षको उद्देश्य :

यस पाठ्यांशको अध्ययनबाट विद्यार्थीहरूले निम्नलिखित भाषिक क्षमता विकास गर्न सक्नेछन्:-

१ आफ्नो व्यावसायिक कार्य क्षेत्रमा प्रभावकारी सञ्चार गर्न

२ आफ्नो व्यवसायसँग सम्बन्धित विविध लेखन सीप प्रदर्शन गर्न

३ कार्य सम्पादनमा आवश्यक परिस्थितिजन्य संवाद गर्न ।

पाठ्यांशको विषयवस्तु

एकाइ १:संचारात्मक नेपाली भाषा   (७)

१.१ भाषिक भेदको परिचय

- मौखिक र लिखित
- औपचारिक र अनौपचारिक
- अमानक र मानक
- सामान्य र प्रयोजनपरक (विशिष्ट) भेदको सोदाहरण परिचय

१.२ दैनिक कार्यमा प्रयोग हुने भाषाको ज्ञान र प्रयोग

- अनुरोध तथा आदेश ⁄ निर्देशन गर्ने भाषाको ज्ञान र प्रयोग
- सोझै गरिने कामहरूमा प्रयोग हुने भाषाको ज्ञान र प्रयोग
- प्रश्नात्मक र वर्णनात्मक भाषाको ज्ञान र प्रयोग

एकाइ २: लेखन सीप   (१८)

२.१ बोध, शब्दनिर्माण र शब्दभण्डारको ज्ञान र अभ्यास

क) शब्द भण्डार निर्माण र अभ्यास

- उपसर्ग
- प्रत्यय, (कृत् तथा तद्धित)
- समास
- प्राविधिक तथा पारिभाषिक शब्दहरूको ज्ञान र प्रयोग

ख)	प्राविधिक ⁄ पारिभाषिक शब्दहरूको शब्दस्रोत,

- वर्णविन्यास (प्राविधिक शब्दका सन्दर्भमा आवश्यक मात्र)

- अर्थ र व्युत्पत्तिका लागि शब्दकोशको प्रयोगको अभ्यास

## २.२	बुँदाटिपोट, सङ्क्षेपीकरण

- बुँदा लेखन

- सारांश लेखन

## *२.३	अनुच्छेद लेखन ⁄ प्रतिवेदन लेखन*

२.४ निबन्ध लेखन

२.५ पत्र लेखन (निमन्त्रणा पत्र, सूचना, सम्पादकलाई चिठ्ठी र निवेदन आदि)

२.६ संवाद लेखन

एकाइ ३: कृति परिचय : निम्न लिखित ढाँचामा तलका कृतिको परिचय लेख्ने अभ्यास (५)

### ३.१	कृति परिचयको ढांचा :

- कृतिको नाम :

- कृतिकारको नाम :

- कृतिका मूल विषयवस्तु : (एक अनुच्छेद)

- कृतिको महत्व : (एक अनुच्छेद)

- कृतिले आफूलाई पारेको प्रभाव : (छोटो एक अनुच्छेद)

- कृतिको भाषा शैली : (छोटो एक अनुच्छेद)

- कृतिको कमी, कमजोरी र सुझाव : (छोटो एक अनुच्छेद)

- निष्कर्ष

### ३.२	कृतिहरू:

- सौर्य उर्जा

- ट्रेड कोर्श (कालिगढ तालिम) : एक परिचय : इ.अ.सं. पश्चिमाञ्चल क्याम्पस पोखरा ।

- भूकम्पबाट सुरक्षित रहन गर्नु पूर्व तयारी: भूकम्प प्रविधि राष्ट्रिय समाज नेपाल ।

- इन्जिनियरिङ नेपाली: लालानाथ सुवेदी ।

- सिंचाई प्रविधि ज्ञान : भोजराज रेग्मी, त्रि. वि. पाठ्यक्रम विकास केन्द्र

सिकाई सामग्रीहरू

- त्रि. वि. पाठ्यक्रम विकास केन्द्र, अनिवार्य नेपाली शिक्षण निर्देशन, काठमाण्डौं

- लालानाथ सुवेदी, इन्जिनीयरिङ नेपाली विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौं ।

- लालानाथ सुवेदी, नेपाली व्याकरण, बोध ⁄ रचना (सम्बन्धित अंश मात्र) विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौं ।

- गोरखापत्र, कान्तिपुर आदि पत्रिका सम्पादकीय, टिप्पणी र लेखहरू ।

- प्रशिक्षकहरूले आफ्नो पुस्तक तयार गर्न वा बजारमा पाइने सामग्री छानेर पढाउन सक्ने, तर परीक्षा महाशाखालाई यसको पूर्व जानकारी दिनुपर्ने

Communication English
EG 1102 SH

Total: 2 hour/week

Year: I   **Lecture: 2 hours/week**
Semester: I   **Tutorial: hours/week**
                 Practical: hours/week
                 Lab: hours/week

Course Description:

This subject consists of four units related to communicative English; writing skills in English; English sounds and structures; and English conversation practices so as to equip the students with the skills and knowledge of communication in English language in order to have an effective and efficient job performance through occupational communication in the workplace.

Course Objectives:

After the completion of this subject, students will be able to:
1. Familiarize with English sound and basic structures.
2. Communicate in English language at work/job environment
3. Define and use trade related technical terminologies
4. Demonstrate situational/structural conversation essential for job performance
5. Demonstrate various writing skills

Course Contents:

Unit 1.   **English sound and basic structures:**   **[2]**
        1.1.   Define with examples:
             ▪ Phonemes
             ▪ Morphemes
        1.2.   Introduction to English sounds with examples: **[2]**
             ▪ The Vowels
             ▪ The Consonants
        1.3.   Dictionary skills   **[3]**
             ▪ Alphabetical order
             ▪ Dictionary entry
             ▪ Guide words, head words
        1.4.   Spellings   **[1]**
             ▪ British and American English spelling

Unit 2.   **Introduction to grammatical units with examples:**
        2.1   Grammatical units   **[2]**
             ▪ The word
             ▪ The phrase
             ▪ The clause
             ▪ The sentence
        2.2   Types of sentence   **[2]**

- Forms
- Function

2.3 Communicative functions **[4]**
- Introducing
- Requests and offers
- Expressing gratuities
- Expressing likes/dislikes
- Asking for permission
- Agreeing/disagreeing
- Encouraging/discouraging
- Inviting/making invites
- Accepting/decling
- Suggesting/advising
- Making and receiving telephone calls
- Group discussing and presentation

Unit 3.   Reading: **[2]**
- Reading comprehension
- Defining trade related terminologies

Unit 4.   Writing skills in English: **[12]**
4.1.   Writing paragraphs
4.2.   Writing dialogues
4.3.   Writing precies/summaries
4.4.   Writing letters
- Job application with resumes
- Leave application
- Business letters
- Orders
- Complains

4.5.   Writing essays
4.6.   Writing technical reports
4.7.   Writing meeting minutes
4.8.   Writing notices
4.9.   Writing notices
4.10.   Writing instructions
4.11.   Writing technical proposal

Learning materials:

1. Poudel, R.C., A Manual to Communicative English, K.P. Pustak Bhandar, Kathmandu, 1956/57.
2. Shah, B.L., A text book of writing skills in English, First edition Hira Books Enterprises, Kathmandu,
3. Fruehling, R. T. and Oldham N. B., Write to the point, McGraw- Hill, Inc. New York NY 10020
4. Tayior, G., English conversation practice, 1975.
5. Maharjan L. B., A textbook of English sounds and Structures, Vidyarthi Pustak Bhandar, Kathmandu, 2000.
6. Todd, LAN introduction to Linguistics, Longman York press, 1991.
7. Blundell, Jon, Higgens, Jonathan & Middlemiss, Nigel, Function of English, Oxford University Press
8. Naterop, Jean, Reuell, Rod, Telephoning in English, Cambridge Universuty Press,
9. Better English Pronunciation, Cambridge University Press, New edition
10. Link English, Central Department of English, Tribhuvan University
11. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
12. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Mathematics I
EG 1103 SH

Total: 5 hour /week

Year: I   **Lecture: 4 hours/week**
Semester: I   **Tutorial: 1 hours/week**
                                                            Practical: hours/week
                                                                Lab: hours/week

Course Description:

This subject consists of four units related to trigonometry; coordinate geometry; algebra; and calculus necessary to develop mathematical background helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area
1. Trigonometric ratios and equations, inverse circular functions and properties of triangles
2. Straight lines, angle between lines, circle and parabola
3. The progressions, permutations and combinations, binomial theorem, exponential and logarithmic series as well as the quadratic and polygonal equations
4. Sets, limit and continuity, derivatives, integration and integrals.

Course Contents:

Unit 1.   **Trigonometry:**   **[12]**
        1.1.   Review of trigonometric ratios:
- Basic trigonometric formulae
- Identities and conditional   identities.

        1.2.   Trigonometric equations:
- Periodicity of trigonometric functions
- General solutions of the following equations:
  - Sin x = k, cos x = k and Tan x = k and using trigonometric equations.

        1.3.   Inverse circular functions:
- Domain and their graphs
- Formulae involving inverse circular functions
- Simple identities and equations involving circular functions

        1.4.   Properties of triangles:
- The sin law
- The cosine law
- The projection law
- The half angle formulae
- The area of a triangle
- The encircles and ex-circles of a triangle

Unit 2.   Coordinate Geometry: **[12]**
    2.1   Straight lines:
- The three standard forms of equations of a line.
- The linear equation: $ax + by + c = 0$.
- Any line through the intersection of two lines.
- Concurrency of lines.

    2.2   Pair of straight lines:
- Angle between two lines
- Bisectors of angles between two lines
- Pair of lines
- Homogeneous equation of second degree
- General equation of second degree representing two lines
- Angle between a pair of lines
- Bisectors of the angles for a line pair
- Lines joining the origin to the points of intersection of a curve and a line

    2.3.   Circle:
- Standard equation
- General form
- Tangents and normal

    2.4.   Parabola:
- Standard equation
- Tangents and normal

Unit 3.   Algebra: **[12]**
    3.1.   Progressions:
- A.P., G.P. and H.P.

    3.2.   Permutations and combinations

    3.3.   The binomial theorem for any index

    3.4.   Series:
- Exponential & logarithmic

    3.4.   Equations:
- Quadratic & polynomial

Unit 4.   Set relation and function: **[8]**
    4.1   Idea of set, set notations, set operations,

    4.2.   Venn diagram,

    4.3.   The set of real members and its subsets.

    4.4.   The absolute value of a real number.

    4.5.   Functions- algebraic and transcendental.

    4.6.   Graphs of simple function.

Unit 5.   Calculus: **[16]**
    5.1.   Limit of community.

    5.2.   Derivatives from definition of simple functions like:
- x^n, $(ax+b)^n$, $\sin(ax+b)$, e^{ax}, a^x, and $\log x$.

    5.3.   Derivatives of sum, difference, product and quotient of functions, chain rule, parametric and   implicit functions

5.4.   Integration, Rules for finding integrals.
5.5.   Standard integrals and their uses.
5.6.   Definite integrals- definition and evaluation.
5.7.   Definite integral as limit of sum.

Learning materials:
1. A Textbook on Engineering mathematics (for Diploma Engineering) part I, Bhim Prasad Kafle, Makalu Publication House, Dillibazar, Kathmandu
2. A Text book of Statistics – B.C. Bajracharya
3. Elementary Statistics – H. C. Saxena
4. Statistical Methods – Mrigendralal Singh
5. Engineering Mathematics I, Hari Nandan Nath, Parishowar Acharya, Vudhyarthi Publisher and distributors, Bhotahity, Kathmandu
6. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
7. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject

Engineering Physics I
EG 1104 SH

Year: I

Semester: I

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: hours/week
Lab: 2 hours/week

Course Description:

This subject consists of four units related to mechanics, heat and thermodynamics, optics, and magnetism necessary to develop background in physics that supports for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the basic concepts related to the followings and apply them in the field of the related engineering area.
1. Mechanics.
2. Heat and thermodynamics.
3. Optics.
4. Magnetism.

Course Contents:

Unit 1.   Mechanics: **[15]**
    1.1   Basic units and measurements:
- Measurement of physical quantities
- Introductory ideas about dimensions of physical quantities.
- Scalar and Vector: definitions and examples, dot and cross product of two vectors
- Composition and resolution of vectors (Triangle law and parallelogram law of vectors)

    1.2   Newton's laws of motion:
- Newton's laws of motion (First, second and third laws)
- Principle of conservation of linear momentum
- Solid friction: Dynamic and rolling friction, laws of solid friction and its verification

    1.3.   Uniform circular motion:
- Angular displacement and velocity.
- Centripetal force and acceleration.
- Motion of bicycle rider

    1.4.   Gravitation:
- Newton's law of universal gravitation.
- Gravitational attraction of earth:
- Acceleration due to gravity.

- Variation of acceleration due to gravity with height, depth, and latitude.
- Motion of satellites:
  - Orbital velocity,
  - Geostationary satellites.
- Weightlessness, motion of lift
1.5. Work, energy, and power:
  - Definition and units of work, energy and power.
  - Potential and kinetic energy.
  - Conservation of energy.
  - Conservative forces.
1.6. Simple harmonic motion (SHM):
  - Simple harmonic motion and its characteristics.
  - Energy of simple harmonic motion.
  - Simple pendulum.
1.7. Equilibrium and rotation of rigid bodies:
  - Forces in equilibrium, torque, couple, C.G. and center of mass.
  - Moment of inertia.
  - Angular momentum and
  - Its conservation.
  - Work done by torque.

Unit 2.   Heat and thermodynamics: [12]

2.1   Heat Phenomena and Quantity of Heat:
  - Concept of temperature and thermal equilibrium.
  - Temperature of scales.
  - Quantity of heat gain or heat loss.
  - Specific heat capacity.
  - Determination of heat capacity by the method of mixtures.
  - Newton's law of cooling.

2.2   Change of Phase:
  - States of matter.
  - Fusion and vaporization.
  - Evaporation and boiling.
  - Specific latent heats of fusion and vaporization.
  - Melting and boiling points.
  - Introduction of Saturated and unsaturated vapors.
  - Variation of melting and boiling points with pressure.
  - Triple point and critical point.
  - Dew point and humidity.

2.3   Thermal Expansion:
  - Coefficients of linear, superficial and cubical expansions of solid and relation between them.
  - Cubical expansion of liquids.
  - Real and apparent expansions.
  - Variation of density due to expansion.

2.4   Heat Transfer:

- Thermal conduction and thermal conductivity
- Convection
- Radiation.
- Perfectly black body.
- Stefan-Boltzman's law of black body radiation.

2.5 Gas Laws:
- Boyle's law,
- Charles law and ideal gas equation.
- Universal gas constant,
- Avogadro number and Boltzman constant.
- Volume and pressure coefficients of ideal gas.

2.6 Kinetic Theory of Gases:
- Pressure in an ideal gas from molecular point of view.
- RMS speed, mean energy of a molecule of an ideal gas.

2.7 Thermodynamics:
- First law of thermodynamics.
- Different thermodynamic process:
  - Adiabatic (equation and work done)
  - isothermal (equation and work done)
  - Isobaric and Isochoric
- Specific and molar heat capacities for different thermodynamic processes, Cp-Cv =R.
- Second law of thermodynamics.
- Efficiency of heat engine

Unit 3. Optics: [8]
3.1 Reflection by plane surfaces
- Nature of light, sources of light
- Review of reflection by plane surfaces
- Deviation due to reflection
  - Deviation of light due to plane mirror
  - Deviation of light due to rotating mirror

3.2 Refraction by plane Surfaces:
- Review of refraction by plane surfaces.
- Lateral shift
- Total internal reflection, critical angle
- Real and apparent depth.

3.3 Reflection by Spherical Surfaces:
- Review of reflection by spherical surfaces.
- Construction of image by ray diagrams and nature of images
- Real and virtual images.
- Nature of images formed by spherical mirrors.
- Mirror formula for concave and convex mirror

3.4 Refraction through Prisms and Lenses:
- Deviation due to prism and minimum deviation.
- Refraction through lenses.

- Lens maker equation.
- Lens formula for converging lens, diverging lens
- Formation of images by lenses.
- Combination of lenses.
- Magnification,
- Power of a lens.

Unit 4.   Magnetism: **[10]**
- 4.1   Magnets and Magnetic fields:
  - Magnetic poles, magnetic moment, magnetic axis, and magnetic meridian.
  - Magnetic field.
  - Coulomb's law for magnetism.
  - Magnetic field due to magnetic poles and bar magnets.
  - Intensity and flux density of magnetic field.
  - Neutral point.
  - Tangent law.
- 4.2.   Earth's Magnetism:
  - Horizontal and vertical components of earth's magnetic field.
  - Declination and angle of dip.
- 4.3.   Magnetic properties of materials;
  - Molecular and modern theory of magnetism.
  - Para magnetism and diamagnetism:
    - Permeability and
    - Susceptibility.
  - Intensity of magnetization.
  - Domain theory of ferromagnetism.
  - Hysterisis

Engineering Physics Practical I   **[30]**
1. Determine volume of hallow cylinder by using vernier calipers.
2. Determine density of a steel / glass ball by using screw gauge.
3. Determine thickness of glass plate using spherometer and calculate the area by using millimeter graph paper.
4. Determine the acceleration due to gravity by using simple pendulum.
5. Determine the magnetic movement of a bar magnet by using deflection magnetometer.
6. Determine the refractive index of the material of prism.
7. Determine specific heat capacity of solid by the method of mixtures.
8. Determine specific latent heat of ice by the method of mixtures.
9. Determine specific gravity of different solids by up thrust method.
10. Determine focal length of a converging lens by displacement method.

Learning materials:
1. Advanced level physics by Nelkon and Parker
2. A textbook of physics, part I and part II by Gupta and Pradhan
3. Numerical problems in Engineering Physics for Diploma in Engineering I & II, Pankaj Sharma Ghimire & Krishna Shrestha, S.K. Books, Dhapasi, Kathmandu

4. Engineering Physics I, Diploma in Engineering (first Year, First part) by Dhan Prasad Poudyal, Khemnath Poudyal, Suresh Prasad Gupta, Binaya Devkota, Laxmi Pustak Bhandar
5. Physics Practical Guide by U.P. Shrestha, RPB

Other learning materials:
1. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
2. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Chemistry I
EG 1105 SH

Total: 6 hour /week

Year: I

Semester: I

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: hours/week

Lab: 2 hours/week

Course Description:

This subject consists of three units related to general chemistry, language of chemistry, and system of classification necessary to develop background in chemistry that supports for the understanding and practicing related engineering works.

Course Objectives:

After the completion of this subject, students will be able to explain the basic concepts related to the followings and apply them in the field of related engineering works:

1. General chemistry
2. Language of chemistry
3. System of classification

Course Content:

Unit: 1:   Language of chemistry: **[4]**
      1.1   Symbol:
- Definition
- Significance (qualitative and quantitative)

      1.2   Formula:
- Definition
- Significance (qualitative and quantitative)
- Concept of valency in terms of combining capacity with H_2, O_2, and Cl_2
- Variable valency (ref. Fe, Sn, Pb, Cu, Hg, S and N)
- Radicals (electro- positive and electro - negative)
- Writing a formula

      1.3   Chemical equation:
- Definition
- Types requisites
- Significance and limitation
- Balancing of chemical equation by hit and trial method and Partial equation method

Unit: 2:   General chemistry: **[8]**
      2.1   Atom and molecule:
- Definition
- Dalton's atomic theory and modern position of the theory

2.2 Atomic weight:
- Definition
- Determination of atomic weight by Dulong and Petit's method and Related numerical problems

2.3 Molecular Weight:
- Definition
- Avogadro's hypothesis
- Application of Avogadro's hypotheses (Mol. Wt=$2 \times$V.D., in the deduction of atomicity of elementary gases H_2, Cl_2, O_2, and N_2)
- Molecular weight determination by Victor Meyer's method and Related numerical problems

2.4 Equivalent weight:
- Definition
- Equivalent weight of element, acid, base and salt
- Equivalent weight determination by hydrogen displacement method and oxide method.
- Numerical relation between equivalent weight, atomic weight and valency
- Some related problems of equivalent wt. (From Hydrogen displacement method and oxide method)

2.5 Simple mole concept:
- Mole of an atom
- Mole of a molecule
- Molar volume and
- Simple calculation on mole concept

Unit: 3: System of classification: [33]
3.1 Acid, Base and Salt:
- Arrhenius concept of acid and base
- Lowry and Bronsted concept of acid and base
- Conjugate acid and base
- Amphoteric nature of water
- Lewis concept of acid and base
- Properties of acid and base.
- Definition of Salt
- Types of salt (normal, acidic and basic)
- Concept of hydrogen ion concentration, pH value and pH Scale
- Buffer solution.

3.2 Volumetric analysis:
- Definition of titration (acidimetry and alkalimetry),
- Indicator
- End-point (neutralization point)
- Standard solution (primary and secondary standard solution), Normal, Decinormal, Molar, Molal solution
- Requisites of primary standard substance
- Volumetric equation,

- Express the strength of solution Normality, Molarity, Molality, gramper litre and percentage and related numerical problems
3.3 Periodic table:
- Mendeleef's periodic law
- Mendeleef's periodic table
- Characteristics of groups and periods in the table
- Advantages and anomalies of the periodic table
- Modern periodic law
3.4 Electronic theory valency:
- Assumptions
- Types
- Electrovalency eg. NaCl, MgO, CaS
- Covalency eg. H_2, O_2, N_2, CH_4, H_2O, NH_3, C_2H_2
- Coordinate co-valency eg.H_2O_2, SO_2, O_3, SO_3)
- Electronic dot structure of some compounds eg.H_2SO_4, $CaCO_3$, K_2SO_3
3.5 Electrolysis:
- Definition of electrolyte, non-electrolyte and electrolysis
- Faraday laws of electrolysis,
- Application of electrolysis (electroplating and electro refining)
- Electrolysis of acidulated water
3.6 Oxidation and reduction:
- Classical definition
- Electronic interpretation
- Oxidizing agent: Definition and eg O_2, O_3, oxyacids, halogens, $K_2Cr_2O_7$, $KMnO_4$
- Reducing agent:Definition and eg. H_2, H_2S with some examples,
- auto-oxidation eg.H_2O_2, HNO_2, SO_2
- Idea of oxidation number
- Balancing chemical equation by oxidation number method
3.7 Atomic structure:
- Subatomic particles (electron, proton and neutron)
- Classical α - rays scattering experiment
- Rutherford's atomic model and its drawbacks
- Bohr's atomic model (postulates only)
- Composition of nucleus
- Mass number and atomic number
- Isotopes and isobar
- Arrangement of electron (Bohr - Bury Scheme)
- Concept of shell and sub shell,
- Electronic Configuration and atomic structure of Some elements (Atomic no. 1 to 30)
- Hund's rule
- General idea of quantum number and Pauli's exclusion principle
3.8 Corrosion:
- Definition

- Types
- Direct and indirect method and prevention against corrosion
  - 3.9 Activity and electrochemical series:
    - Definition
    - Action of water, acid and oxygen on metals.

Engineering Chemistry Practical I [30]
1. Simple Glass Working **[6]**
   a. to cut the glass tube into three equal parts and round up their shape edges
   b. to bore a hole through a cork
   c. to bend the glass tubing into acute, obtuse and right angle
   d. to draw a jet and capillary tube
   e. to fit up a wash bottle
2. To separate sand and copper sulphate crystals in pure and dry state from the mixture of sand and copper sulphate **[2]**
3. To separate sand and calcium carbonate in pure and dry state from the mixture of sand and calcium carbonate **[2]**
4. To prepare pure water from supplied impure water by distillation and o test the purity of the sample prepared **[2]**
5. To neutralize dilute sulphuric acid with sodium carbonate solution, and to recover crystals of sodium sulphate **[2]**
6. To obtain pure and dry precipitate of barium sulphate by treating excess of dilute sulphuric acid with barium chloride solution **[2]**
7. To investigate the composition of water by electrolysis by using Hofmann's apparatus [2]
8. To determine the equivalent weight of reactive metal by hydrogen displacement method. **[2]**
9. To determine the pH of different unknown solution and using pH paper and universal indicator **[2]**
10. To prepare primary standard solution of sodium carbonate and to use it to standardize an approximate decinormal acid solution **[2]**
11. To standardize given unknown acid (Approx N/10) solution by preparing standard alkali solution. (Expression of strength in different ways) **[2]**
12. To standardize given unknown alkali (approximately N/10) solution with the help of by preparing standard acid solution. (Expression of strength in different ways) **[2]**
13. To carry out conductivity experiments on solids and liquids ($CuSO_4$, Zn, Mg, Al, Fe, CCl_4, C_6H_6, C_2H_5OH) **[2]**

Text books:
1. A Text book of Chemistry, Jha and Guglani
2. Foundations of Chemistry, Vol. 1, M.K. Sthpit and R.R. Pradhananga

Reference books:
1. Fundamentals of Chemistry, K.R. Palak
2. Inorganic Chemistry, Bahl and Tuli
3. A Text book of Engineering Chemistry, R.S. Sharma
4. A Textbook of Inorganic Chemistry, L.M. Mitra
5. Elementary practical chemistry, M.K Sthapit
6. Engineering Chemistry, M.L. Sharma, K. M. Shrestha, PN, Choudhary
7. A Textbook of Engineering Chemistry, Prakash Poudel

Other learning materials:
1. Other references to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
2. **Note:** The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Drawing

EG 1106 ME

Total: 4 hours/week

Year: I   **Lecture: hours/week**
Semester: I   **Tutorial: hours/week**
                                                                Practical: 4 hours/week
                                                                Lab: hours/week

Course Description:

This course deals with geometrical construction, orthographic projections and basic techniques of freehand sketch.

Course Objectives:

After completing this course the students will be able to
1. represent different shapes accurately by applying geometrical constructions,
2. project point, line, plane and geometrical solids,
3. represent three dimensional objects in orthographic form and dimension them,
4. use freehand techniques to sketch different shapes

Course contents:

Unit 1: Introduction   [4]
   1.1   Engineering drawing as graphic language
   1.2   Drawing instruments
   1.3   Scale: reduced scale, enlarged scale, full size scale
   1.4   Conventional line types
   1.5   Sheet size and sheet layout
   1.6   Drawing exercises on above sub units

Unit 2: Technical lettering &dimensioning   [4]
   2.1   General procedure for freehand technical lettering: letter stroke, letter proportion, use of pencil and pens, uniformity of letters
   2.2   Single stroke vertical capital letters, Single stroke inclined capital letters, Single stroke vertical lowercase letters, Single stroke inclined lowercase letters, vertical and inclined numerals, vertical and inclined fractions
   2.3   Dimensioning terms and notations
   2.4   Techniques of dimensioning: Size and location of dimensioning
   2.5   Types of dimensioning: Aligned and Unidirectional
   2.6   Rules for dimensioning
   2.7   Drawing exercises on above sub units

Unit 3: Geometrical construction   [12]
   3.1   Draw parallel and perpendicular lines
   3.2   Bisection and trisection on straight lines and angles
   3.3   Divide a straight line into any number of equal parts and proportionately.
   3.4   Construction of polygons (triangles, squares, regular pentagon, regular hexagon, regular heptagon, regular octagon) inscribing and circumscribing about a given circle.

3.5   Determine center and draw tangent on circular arcs and circles (including open, cross belt tangents and ogee curve between two parallel lines)
3.6   Construction of standard curves (Conic section - parabola, ellipse, and hyperbola; Special Curves- cycloid, helix, spiral, involute)
3.7   Drawing exercises on above sub units

Unit 4:   Projection of points, lines and planes   [8]
4.1   Principle of projection
4.2   Principle planes of projections, four quadrants
4.3   Projection of point, line and plane on HP and VP
4.4   True Length of an oblique line
4.5   True shape of an oblique plane
4.6   Drawing exercises on above sub units.

Unit 5:   Projection of geometrical solids   [4]
5.1   Types of solids: polyhedral and solids of revolution
5.2   Projection of prismatic objects (triangular square base, circular base, hexagonal base)
5.2   Projection of pyramidal objects (triangular square base, circular base, hexagonal base)
5.3   Projection of points on the surfaces solids
5.4   Drawing exercises on above sub units.

Unit 6:   Orthographic projection   [24]
6.1   Principle of orthographic projection
6.2   Systems of orthographic projection: first angle and third angle
6.3   Draw an orthographic drawing (rectangular objects with horizontal, vertical and inclined surfaces, objects with cylindrical surfaces)
6.4   Analysis of three views including missing views
6.5   Drawing exercises on above sub units with dimensioning

Unit 7   Freehand Sketching   [4]
7.1   Techniques of sketching: pencil hardness, paper with grid or lines
7.2   Techniques for horizontal and vertical lines; arcs and circles
7.3   Free hand exercise of different shapes with lines, arcs, and circles

Reference:
1.   Luzadder, W.J., Fundamental of Engineering Drawing, Prentice-Hall of India Pvt-Ltd., New Delhi, Latest edition.
2.   Bhatt N. D. and Panchal V.M., Engineering Drawing, Charotar Publishing House, 2001.
3.   Gill P.S, Engineering Drawing, S. K. Kataraia& Sons, New Delhi, 2004/2005

IT Fundamentals
EG 1110 CT

Total: 7 hour /week

Year: I

Semester: I

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: hours/week

Lab: 3 hours/week

Course Description:

This course deals with the introduction of the computer fundamentals, hardware components, peripherals, computer programming, email-internet concept and the practical on word processing, spreadsheet, and database package and presentation.

Course Objective:

After completing this course the student will be able to:

- understand computer system, its hardware and software
- use of computers in their daily academic activities
- explore the world by Internet and email
- Protect their computer by using antivirus software etc.

Course Contents:

Unit 1.   INTRODUCTION AND EVOLUTION OF COMPUTER   [6]
      1.1   Basic introduction of computers (Features, application/scope/uses)
      1.2   History of computers (Mechanical Era, Electro-Mechanical Era, Electronic Era) and its Generation.
      1.3   Types of computer
      1.4   Importance of computers in 21st century.

Unit 2.   COMPUTER SYSTEMS   [22]
      2.1   Block diagram of computer system
      2.2   Components of computer system
      2.3   Basic hardware components of computer system
            2.3.1.1 Input devices
            2.3.1.2 Processing hardware
            2.3.1.3 Storage devices
            2.3.1.4 Output devices
      2.4   Central Processing Unit (ALU, CU, Register Array and Bus Architecture)
      2.5   Memory Unit
            2.5.1.1 Primary Memory
               ➤ Cache Memory
               ➤ RAM (SRAM, DRAM)
               ➤ ROM (PROM, EPROM, EEPROM)
            2.5.1.2 Secondary Memory
               ➤ Magnetic Storage: Magnetic Disk, Magnetic Tape
               ➤ Optical Storage: (CD-ROM, DVD-ROM,)
               ➤ Flash Memory
      2.6   Input Unit/Devices

- Keyboard, Mouse, Joystick, Trackball, Light pen, Touch pad, Touch Screen, Digital Camera, Scanner, OCR, OMR, BCR, MICR, Digitizing Tablet

    2.7   Output Unit/Devices
- Monitor (CRT, LCD, LED)
- Printer (Impact: dot matrix printer) Non-impact: (Laser printer, Ink-jet printer, Thermal printer)
- Multimedia projector
- Speakers

    2.8   Parallel port, serial port, PS/2 port, USB port, DVI port, sockets, VGA port, interfacing (IDE, SATA, PATA)

Unit 3. SOFTWARE [12]
    3.1   Types of software
        3.1.1.1   System Software (Operating System, Devices Driver and Utility Software)
        3.1.1.2   Application Software (Packaged Software and Tailored Software)
    3.2   Operating system and its importance (DOS, Windows, UNIX, LINUX introduction only)

Unit 4. CONCEPT OF INTERNET AND OFFICE AUTOMATION PACKAGE [5]
    4.1   History and growth of Internet
    4.2   Web Browser
    4.3   URL
    4.4   WWW
    4.5   Search Engine
    4.6   Internet Protocols
    4.7   Email Services
    4.8   Uses of Internet (Internet Telephony, E-commerce, e-Government, e-Education, e-Health and Videoconferencing)
    4.9   Concept of intranet and extranet.
    4.10   Introduction to Office automation package and its importance

Practical: [45]
Lab No. 1: Identification of hardware components
Lab No. 2: Installation of OS and Application Programs
Lab No. 3: Windows 7 or more Fundamentals (File handling, desktop customization, control panel customization)
Lab No. 4: Practice with Internal and External basic commands of DOS
Lab No. 5: Word Processing
- Create Save, save as, open, close document
- Creating and formatting documents
- Managing page numbers, header and footer
- Create and customize the table
- Proofing and layout a document
- Inserting citation and Table of contents
- Use Mail merge
- Manage printing documents

Lab No. 6: MS Power Point:
- Create and save presentations
- Apply layout and templates
- Design slides.
- Animation on slide
- Inserting hyperlink, slide number, date and time

- Slide Transactions
- Master Slides
- Slides printing

Lab No. 7: MS Excel:
- Practices on save, open worksheet and workbook
- Demonstrate shell address
- Formatting worksheets.
- Sorting and filtering data
- Use Financial, Statistical Functions in Excel
- Creating, formatting graphs
- Print excel data sheet and page setup

Note: Students should present their works and progress report monthly to the teachers.

Reference books:
1. Leon, Alexis & Mathews Leon (1996). **Fundamentals of Information Technology**, Vikash Publication
2. Stephen Doyle, (1999). **Information Systems For You**, 2nd, Stanley Thornes (Publishers) Ltd.
3. French, C.S (1996). **Computer Science**, 5th, W.M. Print Ltd.
4. Norton, Peter, (2006). **Introduction to Computers**, 6th, Tata McGraw-Hill
5. Jaiswal, S. (2001). **Information Technology Today**, 3rd, Galgotia Publication
6. Gurung, J.B.; Baskota, A.; Baral, D.S.; Baral, D.; Niroula, R.; Dhakal, T.P.; **A Text Book on Computer Science Part-A**, Kathmandu, Bhundipuran Prakashan.
7. Subba. B.R.; **Computer Science Grade-XI**, Kathmandu: Taleju Prakshan.
8. Sinha, Pradip K. & Sinha Priti, **Computer Fundamentals**, 4th, BPB Publication

Web references
- http://en.wikipedia.org/wiki/computer
- http://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://computer.howstuffworks.com
- http://www.google.com.np

C Programming
EG 1111 CT

Total: 8 hour /week

Year: I

Semester: I

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: 4 hours/week

Course Description:

This course deals with the problem solving techniques using C programming language. It provides the students with the knowledge of the basic features of the C language such as data types, operators, control structure, array, functions, structure, pointer and file handling.

Course Objective:

After the completion of this course the students will be able:

- To implement the essential programming concepts and methods in practices.
- To explore the programming execution procedure using compiler, memory and library.
- To develop the practical knowledge of problem solving by using the computer languages.

Course Contents:

Unit 1 Problem Solving Method: **[4]**
      1.1 Concept of programming
      1.2 Assembler, Compiler and Interpreter
      1.3 Problems solving tools
          1.3.1   Algorithms
          1.3.2   Flowcharts

Unit 2 Introduction to C: **[4]**
      2.1 History of C
      2.2 Character Set, Keywords and identifier
      2.3 Data types
      2.4 Constant
      2.5 Operator and expression evaluation
      2.6 Escape sequences
      2.7 Tokens in C

Unit 3   Basic Input and Output: [4]
      3.1   Formatted Input/ Output
      3.2   Unformatted Input/ Output

Unit 4   Control Statements   **[8]**

      4.1 Conditional   Statement: if, if…else, Nested if…else, if….else if

      4.2 Switch Statement

      4.3 Loop: for, while, do-while

      4.4 Nested loop

      4.5 Break and continue

Unit 5   Functions: **[5]**
      5.1   Definition of a Function
      5.2   Function Components (Function Prototypes, Call and Definition)
      5.3   Types of function based on return type and arguments passed.
      5.3   Function call by value and reference
      5.4   Recursion function

Unit 6   Arrays, Strings   **[8]**
      6.1   Introduction to Arrays
      6.2   One dimension array
      6.3   Basic array operation
      6.4   Multidimensional array and matrix
      6.5   Passing array to function
      6.6   Array of strings
      6.7   String handling function in C
      6.8   String Handling functions

Unit 7 Pointer   **[4]**
      7.1 Introduction to pointer
      7.2 Pointer Arithmetic
      7.3 Relation between array and pointer
      7.4 Dynamic Memory Allocation

Unit 8   Structures and Union   **[4]**
      8.1 Introduction to Structure
      8.2 Declaring and accessing structure member
      8.3 Nested Structure
      8.4 Declaring and accessing Union element
      8.5 Difference between structure and union

Unit 9 File Handling   **[4]**
      9.1 opening and closing files
      9.2 creating files
      9.3 processing file (Read,Write,Append)

Practical: The laboratory exercises should cover all the topics mentioned above.
1. Create, compile and run simple C programs, handle different data types available in Perform arithmetic operation in C, perform formatted input and output operations.
2. Perform logical test, make decision making problems, use to loop to repeat task, use various kinds of loops as well as nesting the loop.
3. Create user defined function; create recursive functions; work with automatic, global and static variables.
4. Create and manipulate array and matrices (Single and 2D), string manipulations, inbuilt string handling functions.
5. Referencing and dereferencing of pointer, pointer arithmetic, array and pointer relations, and dynamic memory allocation.
6. Initializing and accessing structure member, nested structure. Initializing and accessing Union. Comparison between structure and union.
7. Create a text and binary file. Perform the operation of read, write, append and closing the file.

Reference books:
1. Gotterfried, B. (2001). Programming with C. (3rd ed.). India: Mcgraw Hill Education.
2. Bhatta, R.D. (2015). A Text Book of C Programming. (3rd ed.). Nepal: Vidyarthi Pustak Bhandar.
3. Thareja, R. (2015). Introduction to C Programming. (2nd ed.). India: Oxford University Press.
4. Kantekar, Y. (2012). Let us C. (10th ed.). India: BPB Publications.
5. Balagurusamy, E. (2008). Programming in ANSI C. (6th ed.). India: The McGraw Hill Companies.

First Year (Second Semester)

Second Semester
Subjects:

EG1201SH	**Engineering Mathematics II**
EG1202SH	**Engineering Physics II**
EG1203 SH	**Engineering Chemistry II**
EG1210 CT	**Digital Logic**
EG 1211CT	**Object Oriented Programming in C++**
EG1216 EE	**Electrical Engineering**
EG1212 CT	**Web Technology**

Engineering Mathematics II
EG 1201 SH

Total: 4 hour /week

Year: **I**   **Lecture: 3 hours/week**
Semester: II   **Tutorial: 1 hours/week**
                 Practical: hours/week
                   Lab: hours/week

Course Description:

This subject consists of five units related to vectors; algebra; calculus; geometry; and statistics necessary to develop mathematical background helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to:
1. Explain the concepts of vectors in plain and vectors in space and apply them in the field of the related engineering area
2. Explain the concepts of the complex numbers, linear inequalities and programming apply them in the field of the related engineering area.
3. Explain the concepts of determinants and matrices and apply them in the field of the related engineering area
4. Explain the concepts of determinants and matrices and apply them in the field of the related engineering area
5. Explain the concepts of applications of derivatives and areas of curves and apply them in the field of the related engineering:
6. Explain the concepts of coordinates in space and planes and apply them in the field of the related engineering area
7. Explain the concepts of statistics and apply them in the field of the related engineering area.

Course Contents:

Unit 1. Vectors: **[9]**
   1.1. Vectors in plane, addition and subtraction.
   1.2. Composition and decomposition of vectors.
   1.3. Vectors in space.
   1.4. The unit vectors i, j, k
   1.5. Product of two vectors-
     • dot product,
     • cross product,
   1.6. Simple applications.
Unit 2. Algebra: **[15]**
   2.1. Complex number in the from A+ ib.
     • Algebra of complex numbers.

- Polar representation of complex numbers.
    2.2.   De Moivre's theorem and its applications
    2.3.   Linear inequalities and their graphs.
- System of linear inequalities in two variables,
- System of linear inequalities in two variables,
- Linear programming: Problems involving two variables under given linear constraints
    2.4.   Determinants and matrices,
- Algebra of matrices,
- Properties of determinants,
- Ad joint and inverse of matrices.
- Solution of linear equations using cramers' rule
- Row equivalent matrices
- Idea of polynomial equations

Unit 3.   Calculus: [9]
    3.1.   Applications of derivatives-
- Tangents and normal to a curve taking slope as derivative
- Maxima and minima of a function
- Derivative as rate of change

    3.2   Areas under curves:
- Use of definite integral as limit of a sum to find areas under curves
- Areas of closed curves and
- Areas between curves.

    3.3   Antiderivatives:
- Curve tracing, maxima and minima
- Rieman sums & integral
- Application of fundamental theorem

Unit 4.   Geometry: [6]
    4.1.   Coordinates in space,
    4.2.   Coordinates in planes.

Unit 5.   Statistics: [6]
    5.1.   Statistics:
- Introduction to statistics
- Measures of Central Tendency
- Measures of Dispersion
- Moments, Skewness and Kurtosis
- Correlation and Regression

    5.2.   Probability:
- Concept of Probability
- Concept of conditioned probability
- Concept of independent and dependent events
- Concept of mutually exclusive events

Learning materials:
1. A Textbook on Engineering mathematics (for Diploma in Engineering) part II, Bhim Prasad Kafle, Makalu Publication House, Dillibazar, Kathmandu
2. A Text book of Statistics – B.C. Bajracharya
3. Elementary Statistics – H. C. Saxena
4. Statistical Methods – Mrigendralal Singh
5. Engineering Mathematics I, Hari Nandan Nath, Parishowar Acharya, Vidhyarthi Publisher and distributors, Bhotahity, Kathmandu
6. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
7. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject

Engineering Physics II
EG 1202 SH

Year: I
Semester: II

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: hours/week
Lab: 2 hours/week

Course Description:

This subject consists of four units related to electricity, waves, properties of matter, and modern physics necessary to develop background in physics that supports for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to:
1. Explain the basic concepts related to the electricity and apply it in the field of the related engineering area
2. Explain the basic concepts related to the waves and apply it in the field of the related engineering area
3. Explain the basic concepts related to the properties of matter and apply it in the field of the related engineering area
4. Explain the basic concepts related to the modern physics and apply it in the field of the related engineering area.

Content Contents:

Unit 1.   Electricity: **[16]**
      1.1.   Electrostatics:
- Elementary charge, charging and induction.
- Faraday's ice-pail experiment.
- Idea of electric field
- Lines of forces.
- Coulomb's law.
- Intensity of electric field.
- Electrostatic potential, equipotential.
- Surfaces.
- Potential and field strength.
- Potential gradient.
- Action of point.
- Van de Graaf generator.
- Capacitors.
- Different types of arrangement of capacitors.
- Energy storage.
- Action of dielectrics

1.2.	Current electricity:
- Basics:
- D.C. Current.
- Strength of Current.
- Potential difference across a conductor.
- Ohm's law and its verification.
- Resistance and resistivity.
- Electrical measurements:
- Galvanometer, Ammeter and voltmeter
- Conversion of Galvanometer into Ammeter and voltmeter
- Potentiometer and comparison of emf and measurement of internal resistance
- Kirchhoff's law and their use to analyze simple circuits, Whitestone bridge
- Heating effect of current:
- Joules law and it's verification, electric power, maximum power theorem
- The rate of heating from the concept of p.d.
- Thermoelectricity:
- See-beck effect, variation of thermo e.m.f. with temperature
- Peltier effect and
- Thomson effect.

1.3.	Magnetic effect of current and electromagnetism:
- Magnetic forces and magnetic field of current:
- Force experienced by charge moving in magnetic field.
- Maxwell's crock screw rule.
- Force applied by magnetic field on current carrying conductor.
- Torque on current carrying coil in magnetic field.
- Theory of moving coil galvanometer.
- Biot-Savart's Law
  - Field due to a long straight conductor and due to circular coil.
  - Force between two parallel conductors carrying current.
- Ampere's law
  - Magic field due to the solenoid and long straight conductor.
- Electromagnetic induction:
- Faraday's law of electromagnetic induction and Lenz's law.
- Phenomenon of self-induction.
- A.C. generator.
- D.C. generator.
- Transformer.

1.4	Alternating current:
- Instantaneous and effective values of current and voltage.
- Phase between current and voltage across different elements of circuit.
- Capacitive and inductive reactance.
- Impedance.
- Resonance.

- Power in a.c. circuit

Unit 2.   Waves: **[9]**
    2.1.   Wave motion:
- Wave motion.
- Types of wave motion
- Characteristics of wave motion
- Wavelength, frequency and speed of waves
- Speed of waves in different media.
- Velocity of sound in air.

    2.2.   Wave phenomena:
- Sound waves.
- Beats and their formation.
- Progressive waves.
- Stationary waves.
- Waves in strings and pipes: fundamental vibrations and overtones.
- Intensity of sound.
- Intensity level.
- Inverse square law.

    2.3.   Physical optics:
- Interference of light waves and coherent sources.
- Phase difference and path difference. Young's double slit experiment.
- Introduction of Diffraction of light waves.
- Introduction of Huygen's principle.
- Polarizationandunpolarizedlights,polarizationbyreflection(Brewster's law)

Unit 3.   Properties of matter: **[10]**
    3.1   Elasticity:
- Elasticity, Hook's law, Young's modules, Bulk modulus
- Elasticity of shear.

    3.2   Surface tension:
- Intermolecular attraction in liquid, surface tension.
- Cohesion and adhesion, angle of contact, capillary action
- Coefficient of surface tension and surface energy (Only introduction).

    3.3   Viscosity:
- Stream line and turbulent flows.
- Idea of liquid layer, Velocity gradient, Viscosity and its coefficient.
- Comparison of viscosity with solid friction, Viscous forces, Stoke's law, Terminal velocity, determination of coefficient viscosity

Unit 4.   Modern physics: **[10]**
    4.1   Atomic physics:
- Photons, Photoelectric effect, Einstein's photoelectric equation and stopping potential for photoelectrons.
- Motion of charged particles in simultaneously applied electric and magnetic fields, e/m for electron, Milliken's oil drop experiment. Bohr model for hydrogen atom. Energy level diagrams and spectral series.

- X-rays:Production, nature and uses.
- Laser (introduction only)

4.2   Semiconductors:
- Energy states of valent electrons in solids, energy bands.
- Semiconductors, intrinsic and doped, p-type and n-type semiconductors.
- Majority and minority carries.
- Acceptors and donors, p-n junction, diode and depletion layer, forward and reverse bias.
- Rectifying property of diode
- Transistor and it's uses

4.3   Nuclear physics:
- Laws of radioactive disintegration: half life, mean life, and decay constant.
- Stable and radioactive nuclei.
- Binding energy and mass defect
- Fission and fusion.

Engineering Physics Practical II: **[30]**
1. Determine specific resistance of a wire.
2. Determine the frequency of A.C. mains.
3. Study current voltage characteristics of a junction diode.
4. Determine speed of sound by resonance air column method.
5. Determine Young Modulus.
6. Verify Ohm's law.
7. Determine force constant of a helical spring oscillation method.
8. Compare Emfs of two cells by using potentiometer.
9. Study characteristic curves of npn transistor.
10. Determine unknown resistance by Wheatstone bridge method.

Learning materials:

Text books:
1. Advanced level physics by Nelkon and Parker Vth and later editions
2. A textbook of physics, part I and part II by Gupta and Pradhan
3. Numerical problems in Engineering Physics for Diploma in Engineering I & II, Pankaj Sharma Ghimire & Krishna Shrestha, S.K. Books, Dhapasi, Kathmandu

Text book for laboratory work:
   1. Physics Practical Guide by U.P. Shrestha, RPB

Other learning materials:
3. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
4. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Chemistry II
EG 1203 SH

Year: I
Semester: II

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: hours/week
Lab: 2 hours/week

Course Description:

This subject consists of three units related to nonmetals and their compounds; metals and their compounds; and organic compounds and synthetic materials necessary to develop background in chemistry that supports for the understanding and practicing related engineering works.

Course Objectives:

After the completion of this subject, students will be able to explain the basic concepts related to the followings and apply them in the field of related engineering works:
1. Nonmetals and their compounds
2. Metals and their compounds
3. Organic compounds and synthetic materials

Course Content:

Unit: 1:   Non-metals and their compounds: **[20]**
   1.1   Water:
   - Source of water
   - Hard and soft water
   - Removal of temporary and permanent hardness of water
   - Water treatment of domestic and industrial purpose
   1.2   Ammonia:
   - Lab preparation
   - Manufacture by Haber's process
   - Properties and uses
   1.3   Nitric acid:
   - Manufacture by Ostwald's process
   - Properties and uses.
   - Nitrogen cycle
   - Fixation of Nitrogen
   - Chemical fertilizers
   - Oxides of nitrogen as pollutant (general concept)
   - Acid rain (due to oxides of nitrogen and oxide of Sulphur "Sulpherdioxide")
   1.4   Halogens (Chlorine):
   - Lab preparation
   - Properties and uses

1.5 Hydrochloric acid:
- Lab preparation
- Properties and uses

1.6 Hydrogen Sulphide:
- Lab preparation
- Properties and uses

1.7 Sulphuric acid:
- Manufacture by contact process)
- Properties and uses

1.8 Carbon and its compounds:
- Allotropes of carbon (reference of diamond & graphite & their structure).
- Oxides of carbon (Ref. carbon dioxide & carbon mono oxide as pollutants)- general idea only

Unit: 2: Metals and their compounds: [15]

2.1 General study of metals and their components:
- Difference between metal and non metal
- Combined & free state of metals
- Chemistry of Metallic Carbonates, Sulphates, Chlorides and Nitrates

2.2 Alkali metals:
- General characteristics of Alkali metals
- Properties & uses of sodium

2.3 Alkaline earth metals:
- General characteristics of the Alkaline earth metals
- Properties & uses of calcium

2.4 Aluminum:
- Properties and uses

2.5 Coinage metals:
- General properties of coinage metals
- Properties and uses of cupper

2.6 Zinc:
- Properties & uses

2.7 Iron:
- Properties & uses

2.8 Lead:
- Properties & uses

2.9 Alloys:
- Definition
- Purpose of making alloys
- Types of alloys

Unit: 3: Organic compounds and synthetic materials: [10]

3.1. Organic compounds
- Organic compounds:
  - Historical background, classification, and nomenclature
  - Functional groups and homologous series

- Saturated hydrocarbon: Properties of Methane
- Unsaturated hydrocarbon: Properties of Ethylene and Acetylene
- Aromatic compounds:
  - Definition
  - Comparison of aliphatic and aromatic compounds
  - Properties of Benzene

3.2. **Synthetic materials:**
- Polymer and polymerization
  - Definition
  - Types of polymer
- Rubber:
  - Types (Natural and Synthetic)
  - Preparation and uses.
- Polyvinyl chloride (PVC):
  - Preparation and uses
- Polythene:
  - Preparation and uses

Engineering Chemistry Practical II:
1. To compare the hardness of different types of water   **[2]**
2. To prepare Bakelite (resin) in the laboratory   **[2]**
3. To determine the condition in which corrosion takes place   **[2]**
4. To investigate the action of acids on some metals (Zn, Mg, Fe, Al, Sn
   & Cu) (acids: HCl, H_2SO_4 (dil.)& HNO_3 (dil)   **[2]**
5. To prepare and study the properties of hydrogen gas   **[2]**
6. To prepare and study the properties of ammonia gas   **[2]**
7. To prepare and study the properties of hydrogen Sulphide gas. (This gas should
   not be prepare individually in woulf bottle but in Kipp's apparatus commonly) **[2]**
8. To detect the acid radicals (Cl^-, NO_3^-, SO_4^{--}, CO_3^{--}) by dry and wet ways   **[4]**
9. To detect the basic radicals (Cu^{++}, Al^{+++}, Fe^{+++}, Zn^{++}, CO^{++}, Ni^{++}, Ca^{++}, Ba^{++}, Mg^{++})by wet
   ways   **[6]**
10. To detect the acid and basic radicals (complete salt analysis)   **[6]**

Textbooks:
1. Foundations of chemistry, Vol-2, M.K. Sthapit and R.R. Pradhananga
2. A text Book of chemistry, Jha & Guglani
3. A text Book of Organic Chemistry, B.S. Bahl & Arun Bahl
4. Elementary qualitative analysis, M.K.Sthapit and C.B.Tuladhar
5. Elementary practical chemistry, MK.Sthapit

Reference books:
1. Inorganic chemistry, Bahl & Tuli
2. Elementary Organic Chemistry, P.N. Bargava
3. Fundamentals of chemistry, K.R. Palak
4. A text Book of Inorganic Chemistry, L.M. Mitra
5. Engineering Chemistry, M.L. Sharma, K.M. Shrestha, P.N. Choudhary
6. A Text book of Engineering Chemistry, Prakash Poudel

Digital Logic
EG 1210 EX

Total: 6 hour /week

Year: I
Semester: II

Lecture: 3 hours/week
Tutorial: hours/week
Practical: hours/week
Lab: 3 hours/week

Course Description:

This course provides an introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of digital signal, number system, logic gates, minimization techniques, and combinational as well as sequential circuits and concludes with digital logic families and digital displays.

Course Objective:
After completing this course, the students will be able to:
- learn and design the combinational logic circuits
- verify truth tables of basic gates and universal gates
- learn and design the sequential logic circuits
- design problem based / predefined logic based circuits

Course Contents:

Unit 1.   Introduction to Digital Signal: **[2]**
      1.1   Analog Signal and Digital Signal
      1.2   Advantages of Digital over Analog Signals
      1.3   Representation of Digital Signal
      1.4   Applications of Digital Signal

Unit 2.   Number Systems and Codes: **[4]**
      2.1   Two State Devices
      2.2   Decimal Number System
      2.3   Binary Number System
      2.4   Octal Number System
      2.5   Hexadecimal Number System
      2.6   Conversions among Different Number Systems
      2.7   Fractions Conversion
      2.8   BCD Code
      2.9   Gray Code
      2.10   Alphanumeric Code:
- ASCII Code
- EBCDIC Code

Unit 3.   Arithmetic Logic Operations: **[5]**
      3.1   Binary Arithmetic
- Binary Addition
- Binary Subtraction

- Binary Multiplication
- Binary Division

    3.2   1's Complement and 2's Complement Method
- 1's Complement Subtraction
- 2's Complement Subtraction

Unit 4. **Logic Gates and Boolean Function :** **[9]**
4.1   Basic Gates: AND, OR, NOT
4.2   Universal Gates: NAND, NOR
4.3   Exclusive Gates: XOR, XNOR
4.4   DeMorgan's Theorems
4.5   The Universal Properties of the NAND Gates
4.6   The Universal Properties of the NOR Gates
4.7   Pulse Operation in Logic Gates
4.8   Combination of Logic Gates
4.9   Boolean Algebra and its Properties/Laws
4.10   Boolean Expression in Logic Gates
4.11   Simplification of Boolean Expressions

Unit 5. **Logic Simplification:** **[4]**
5.1   Karnaugh Map
- K-Map Simplification for Two Input Variables
- K-Map Simplification for Three Input Variables
- K-Map Simplification for Four Input Variables

5.2   Sum of Product (SOP) Simplification
5.3   Product of Sums (POS) Simplification
5.4   K-Maps with *Don't Care* Conditions

Unit 6. **Combinational Logic Circuits:** **[7]**
6.1   Adders
- Half Adder
- Full Adder

6.2   Subtractors
- Half Subtractors
- Full Subtractors

6.3   Encoders
- Decimal to Binary Encoder
- Decimal to BCD Encoder

6.4   Decoders
- Binary to Decimal Decoder
- BCD to Decimal Decoder
- Seven Segment Display Decoder

6.5   Multiplexers
- Data Transmissions
- 4-to-1 Multiplexer
- 8-to-1 Multiplexer

6.6   Demultiplexers
- Demultiplexer and Decoder Relations
- 1-to-4 Demultiplexer
- 1-to- 16 Demultiplexer

Unit 7.   **Sequential Logic Circuits:**   **[7]**

      7.1   Flip-Flops
- RS Flip-Flop and its Truth Table
- D Flip-Flop and its Truth Table
- JK Flip-Flop and its Truth Table
- T Flip-Flop and its Truth Table
- Master-Slave Flip-Flops
- Applications of Flip-Flop

      7.2   Shift-Registers
- Flip-flop as a One-bit Memory Device
- Arithmetic Right/Left Shift Registers
- Serial-in Serial-out (SISO) Shift Register
- Serial-in Parallel-out (SIPO)Shift Register
- Parallel-in Serial-out (PISO)Shift Register
- Parallel-in Parallel-out (PIPO)Shift Register
- Applications of Shift Registers

      7.3   Counters
- Synchronous Counters
- Ripple Counters
- M- Modulus Counters
- Decade Counters
- Ring Counters
- Applications of Counters

Unit 8.   **Digital Logic Families:**   **[5]**

      8.1 Introduction to Digital Logic Families (TTL, ECL,RTL,DTL)

Unit 9.   **Digital Displays:**   **[2]**

      9.1   LED Display
      9.2   LCD Display
      9.3   7-Segments Display
      9.4   Alphanumerical Display
      9.5   Digital Clock Display Design

      Practical: **[45]**

1. Verify the truth tables of basic gates and other gates: AND, OR, NOT, NAND, NOR,XOR and XNOR Gates
2. Realize and verify truth tables applying DeMorgan's Theorems
3. Verify the universal properties of the NAND gate and NOR gate.
4. Realize and verify truth tables of binary half adder/Subtractor and full adder/Subtractor
5. Implement decimal to 3-4 bit binary encoder
6. Realizing the function of 4 bit binary decoder
7. Realizing the function of 4-to-1 multiplexer and 1-to- 4 demultiplexer circuits.
8. Realizing the function of flip-flops, RS,D,JK,T flip-flops
9. Realizing the function shift-registers: SISO,SIPO,PISO and PIPO
10. Realizing the function ripple counters
11. Realizing the function synchronous counters
12. Realizing and designing of seven-segment display-decoder logic circuit

Reference books:
1. Albert Paul Malvino (2006), "Principle of Digital Electronics", The Mc Graw Hill Companies

2. T. Flyod, "Digital Fundamentals", Pearson Publication, 11th edition, 2014.
3. M. Morris Mano, "Digital Logic Circuits and Computer Design", Prentice Hall Publication, 4th edition, 2013.
4. Albert Paul Malvino, Donald P Leach, Goutam Saha," Digital Principles and applications ", The Mc Graw Hill edition, 6th edition, 2006.
5. A. Ananda Kumar, "Fundamental of Digital Circuits", Prentice Hall –India, 2nd edition, 2013.

Object Oriented Programming in C++

EG 1211 CT

Total: 6 hour /week

Year: **I**

Semester: **II**

Lecture: 3 hours/week
Tutorial: hours/week
Practical: hours/week
Lab: 3 hours/week

Course Description:

This course deals with the object oriented programming technique using the C++ programming language. This course introduces the concepts of object-oriented programming to students with a concept of object, class, inheritance, polymorphism, encapsulation and data abstraction. It also gives knowledge about virtual functions, input/output streams and files and templates in C++.

Course Objectives:

After completing this course the students will be able to:
*   analyze the problem with object oriented approach
*   design the problem using object oriented design methods
*   implement the problem in C++ in object oriented way
*   understand various object oriented concepts such as class/object, abstraction, inheritance, operator overloading, dynamic binding, templates in C++ programming language

Course Contents:

Unit1.   **Object Oriented Programming:**   **[4]**
    1.1.   Software Evolution
    1.2.   Basics of object oriented programming
        *   Procedure oriented programming
        *   Object oriented programming
        *   Procedure oriented versus Object oriented programming
    1.3.   Elements of Object Oriented programming
        *   Class & Object
        *   Abstraction & Encapsulation
        *   Inheritance
        *   Polymorphism
        *   Dynamic binding
        *   Message passing
    1.4.   Object oriented languages
    1.5.   Advantage and Disadvantage of OOP

Unit2.   **Introduction to C++**   **[2]**
    2.1.   History and Evolution of C++
    2.2.   Why C++
    2.3.   Features of C++

Unit3.   **C++ Language Basics:**   **[5]**
    3.1.   Character set, tokens (keywords, identifiers, operators)
    3.2.   Commenting
    3.3.   Variable declaration

3.4. Data type
3.5. Type Conversion and promotion rules
3.6. Input/ Output basics
3.7. Preprocessor directives
3.8. Control structures
3.9. Array, Pointer, String
3.10. Dynamic memory allocation
3.11. Functions
- Function overloading
- Default argument
- Inline function
- Pass by reference
- Return by reference
3.12. const construct
3.13. Structure and Unions

Unit4. Object and Class: **[10]**
4.1. Class syntax (similarities with structures)
4.2. Data Encapsulation (public, private modifiers)
4.3. Object and the member access
4.4. Defining member function (inside and outside of the class)
4.5. Constructor and Destructor
4.6. Objects as function arguments
4.7. Returning objects from functions (nameless object)
4.8. Array of objects
4.9. Pointer to objects
4.10. Dynamic memory allocation for objects and object array
4.11. this pointer (returning object using this pointer)
4.12. static data and function members
4.13. inline function
4.14. Constant data member of a class
4.15. Constant member functions and constant objects
4.16. friend function and friend class

Unit5. Overloading Operators: **[5]**
5.1. Over loadable operators
5.2. Syntax of operator overloading
5.3. Unary operator overloading
5.4. Binary operator overloading
5.5. Operator overloading using member operator functions (unary and binary)
5.6. Operator overloading using friend operator functions (unary and binary)
5.7. Index operator overloading
5.8. Data conversion
- Basic to basic (explicit and implicit)
- Basic to user defined and vice versa
- User defined to user defined

Unit6. Inheritance: **[5]**
6.1. Base and derived class (definition with diagrams)
6.2. protected access specifier (show whole class syntax including protected)
6.3. Syntax of derived class declaration (visibility modes)
6.4. Types of inheritance
- Single

- Multiple
- Multilevel

    6.5.   Scope of inherited member functions and variables
    6.6.   Constructors in derived and base class
    6.7.   Destructor in Derived and base class
    6.8.   Member function and data overriding
    6.9.   Ambiguity in member access in overriding members
    6.10.   Virtual base class

Unit7.   Virtual functions: [3]
    7.1.   Pointer to derived class object
    7.2.   Array of pointers to derived class objects with function overriding
    7.3.   Need of virtual functions
    7.4.   Virtual functions definition
    7.5.   Pure Virtual functions and Abstract classes
    7.6.   Virtual Destructor

Unit8.   Input/output Streams and Files: [7]
    8.1.   Input/output Stream class hierarchy
    8.2.   Unformatted Input/output
    8.3.   Formatted Input/output
- ios Stream class member functions and flags
- Standard manipulators
- User defined manipulators

    8.4.   File I/O with streams
    8.5.   File stream class hierarchy
    8.6.   Operations on files
    8.7.   ASCII and Binary files
    8.8.   Opening file, file modes and closing files
    8.9.   File read/write using stream and using read & write function
    8.10.   File pointers and their manipulators
    8.11.   Testing for errors during file operations

Unit9.   Templates: [4]
    9.1.   Function Template
    9.2.   Overloading function template
- Overloading with functions
- Overloading with other template

    9.3.   Class Template
    9.4.   Function definition outside of the class template

Practical:

    [45]

The lab exercise shall different aspects and features of the C++ programming language.
1. Programming with the structured components of the C++ language
2. Simple class and its implementation
3. Creating classes for data types such as complex no, date, time, distance etc and implement them in a program
4. Using constructors and destructors along with the objects
5. Using static and constant member functions and data
6. Using friends functions to act as bridge between the objects

7. Programs to overload different operators
8. Program to convert data from user defined to fundamental data and vice versa, and user defined to user defined type
9. Program to inherit the base class to add new functionality in the base class with example of single, multiple and multilevel inheritance.
10. Using virtual functions pointer to objects in program
11. Binary and ASCII file manipulation
12. Program to create and use function and class templates

Reference books:
1. Balagurusamy, E. (2013). Object oriented programming with C++. New Delhi: Tata McGraw-Hill.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Waite Group/Galgotia Publication, India
3. Deitel & Deitel, "C++ How to program", Second Edition, Pentice Hall India
4. Herbert Schildt, "C++: The Complete Reference", Fourth Edition, Tata McGraw Hill, India Schildt, H. (2003). C++: the complete reference (4th ed). New York: McGraw-Hill.

Electrical Engineering
EG 1216 EE

Course Description:

This course provides the fundamental concepts of DC and AC electrical circuits as well as electrical machine and batteries.

Course Objectives:

After completing this course the students will be able to:
1. identify the basics of electrical circuit elements and laws
2. understand the use of DC and AC supply
3. understand electromagnetic induction and working principle of electric machine
4. understand cells and batteries

Course Contents:

Unit 1:   Electric Circuit Fundamentals: **[6]**
     1.1.   Electric charge and movement of electrons
     1.2.   Electric voltage and current
     1.3.   Circuit elements: Resistor, Inductor, Capacitor
     1.4.   Voltage and current sources
     1.5.   Independent and dependent sources
     1.6.   Electric power and energy

Unit 2:   DC Circuit Analysis: **[7]**
     2.1.   Ohm's law
     2.2.   Series and parallel circuits
     2.3.   Kirchhoff's current and voltage laws
     2.4.   Thevenin's theorem
     2.5.   Nortorn's theorem
     2.6.   Superposition theorem
     2.7.   Maximum power transfer theorem
     2.8.   Loop and nodal equations for electric networks

Unit 3:   Single Phase AC Circuit Analysis: **[8]**
     3.1.   Generation of sinusoidal EMF
     3.2.   Instantaneous, peak, average and RMS values
     3.3.   Application of complex number, review of complex number calculation and use of j operator
     3.4.   Phasor representation of AC quantities
     3.5.   AC excitation for RL, RC and RLC circuits
     3.6.   Resonance in RLC series circuit
     3.7.   Power in AC circuits: active power, reactive power, apparent power, power triangle and power factor

Unit 4:   **3-Phase AC Circuits:**   **[6]**
  4.1.   Generation of 3-phase sinusoidal voltage
  4.2.   Advantage of 3-phase system
  4.3.   Line and phase quantities (current, voltage)
  4.4.   Star and delta connection of 3-phase source and load.
  4.5.   Power in 3-phase circuits

Unit 5:   **Electromagnetism and Electromagnetic Induction:**   **[6]**
  5.1.   Definition of magnetic field, magnetic flux, flux density, filed intensity and permeability of magnetic material
  5.2.   Magnetic field due to current carrying conductor, force on a current carrying conductor
  5.3.   Faraday's laws of electromagnetic induction, induced EMF, lenz's law
  5.4.   Magnetic circuit concept, analogy to electric circuit
  5.5.   Hysteresis loop for magnetic material, hard and soft magnetic material

Unit 6:   **Electric Machines:**   **[8]**
  6.1.   Transformers: Construction and working principle of single phase transformer
  6.2.   DC motor and generator: Construction, generation of voltage and torque production
  6.3.   Single phase AC motor
  6.4.   3-phase induction motor: Construction and working principle
  6.5.   3-phase synchronous generator: Construction and working principle

Unit 7:   **Cells and Batteries:**   **[4]**
  7.1.   Primary and secondary cells: definitions and examples, internal resistance of cell
  7.2.   Lead acid cell: construction, chemical reaction during charging and discharging, methods of charging (constant voltage and constant current charging)
  7.3.   Dry cell, Mercury cell, Ni-Cd cell, Li-ion cell
  7.4.   Series and parallel connection of cells

Practical: **[45]**
  1. Verification of Ohm's law
  2. Verification of Kirchhoff's current and voltage laws
  3. Verification of maximum power transfer theorem
  4. Measurement of active, reactive and apparent power in single phase ac circuit
  5. Measurement of active, reactive and apparent power in three phase ac circuit
  6. Measurement of internal resistance of batteries
  7. Performance of DC motors

Reference books:
  1. Theraja, B.L. & A.K. A textbook of Electrical Technology. Chand (S.) & Co Ltd ,India (July 21, 2008)
  2. Mehta, V.K. Principles of Electrical Engineering. S. Chand Publishing, India.2009.
  3. Toro, V. D. Electrical Engineering Fundamentals. PHI, 2nd Edition, 2011.
  4. Cogdell, R.J. Foundations of Electrical Engineering. Prentice Hall; 1995.
  5. Hughes, E. Electrical and Electronic Technology. Prentice Hall; 2008.

Web Technology I
EG 1212 CT

Total: 6 hour /week

Year: I
Semester: II

Lecture: 3 hours/week
Tutorial: hours/week
Practical: hours/week
Lab: 3 hours/week

Course Description:

This course deals with the concept of web technology and programming in web technology. This course focuses on the development of dynamic web contents and applications to facilitate information distribution. The course will initiate students to the different web development tools and technology such as HTML, CSS, Java Script and GUI based tools.

Course Objectives:
After completing this course the students will be able to:
1. be familiar with the basic technique of web technology and web page design
2. use recent web development software to develop dynamic web contents and applications

Course Contents:

Unit 1.   Internet   **[5]**
  1.1.   History and growth of Internet
  1.2.   Uses of Internet and Services
  1.3.   Web, Webpage, Website, Web Server, Web Browser, URL and Search Engines
  1.4.   Internet Protocols: TCP/IP, ARP, HTTP, FTP, SMTP, POP, SNMP

Unit 2.   HTML   **[20]**
  2.1.   Introduction to HTML
  2.2.   Basic Structure of HTML
  2.3.   HTML **TAGS**
         2.3.1   Paired Tags
         2.3.2   Singular Tags
  2.4.   Comments in HTML
  2.5.   Character formatting
         2.5.1   Heading Tag (H1 to H6)
         2.5.2   Paragraph Tag
         2.5.3   Line Break
         2.5.4   Horizontal Rule
         2.5.5   Text Formatting
  2.6.   FONT tag and Attributes
  2.7.   <OL> and <UL> list tag and attributes
  2.8.   Inserting **IMAGES** and **OBJECTS**
  2.9.   **MARQUEE** tag
  2.10.   Creating **HYPERLINK**
  2.11.   Creating **TABLE**
         2.11.1 <TABLE>, <TR> ,<TH> and <TD> and its attributes
  2.12.   Introduction to **FRAME**
         2.12.1 <Frame> tag and Page Architecture
         2.12.2 <FRAMESET> tag and Attributes

2.13. Introduction to **FORM**
        2.13.1 <form> tag and attributes
        2.13.2 <INPUT>tagand Attribute
        2.13.3<Textarea> and <select> tag
2.14. Introduction of HTML 5 :
        2.14.1. Creating Tables

        2.14.2. Working with Images, Color and Canvas

        2.14.3. Working with Forms

        2.14.4. Interactive Elements

        2.14.5. Working with Multimedia

        2.14.6. Working with API

Unit 3.   **HTML Editors & Tools**   **[5]**
3.1. Use of different HTML editors and tools like Dreamweaver, Microsoft Front Page etc.
3.2. Apply the All HTML tag into GUI Tools
3.3. Graphical and Animation Tools: Use of Different graphical and animation tools like Abode Photoshop and Flash etc.
3.4. Adding Sounds and Animation to the web page (using embed tag)

Unit4. Introduction to Cascading Style Sheet (CSS)[5]
4.1. Syntax
4.2. Inline styles
4.3. Internal style sheet
4.4. External style sheet
4.5. Backgrounds and Color Gradients
4.6. Fonts and Text Styles
4.7. Creating Boxes and Columns
4.8. Displaying, Positioning and Floating an Element
4.9. List Styles and Table Layouts
4.10. Effects, Frames and Controls
4.11. Responsive Web Design

Unit 5.   **Introduction to Server Side and Client Side Scripting:**   **[2]**
5.1 Overview of Server Side and Client Side Scripting
5.2 Difference between Server Side and Client Side Scripting
5.3 Advantages and Disadvantages

Unit 6.   **Client Side Script: Java Script:**   **[8]**
6.1 Introduction
6.2 Adding JavaScript code to HTML page
6.3 JavaScript Data type-Variant subtypes
6.4 Programming Constructs and functions
6.5 Event Handling and JavaScript objects
6.6 Functions, Dialog boxes
6.7 Predefined JavaScript objects
6.8 Using Frames, History object, predefined and user defined objects
6.9 Image, Event and form Objects
6.10 Client side form validation

Practical: **[45]**

Lab No. 1: Design a simple page using Character formatting i.e (Heading Tag (H1 to H6), Paragraph Tag, Line Break, Horizontal Rule, Text Formatting (B, I, U, SMALL, STRONG, SUB, SUP, PRE, STRIKE, and BLOCKQUOTE) and also use FONT tag and Attributes (Size: 1 to 7 Levels, BASEFONT, SMALL, BIG, COLOR).

Lab No. 2: Write an html program to demonstrate the use of **LIST.**

Lab No. 3: Write an html program to demonstrate the use of **TABLE (**use cell padding, cell spacing, row span and cols pan attributes).

Lab No. 4: Write an html code to demonstrate the use of **HYPERLINK (**use internal link, local link, external link).

Lab No. 5: Create a page containing 3 **FRAMES** with 1st frame covering 50% of the screen (vertical coverage) and remaining screen should be horizontally divided into 2 frames. The 1st frame should contain a bio- data and 2nd frame contains the links (i.e. link1 and link2) and the links of these items must be opened in the 3rd frame.

Lab No. 6: Design a **FORM** containing username, password, radio button, checkbox, submit button, drop-down menu and reset button.

Lab No. 7: Write an html program to demonstrate the use of **CSS.**

Lab No. 8: Write an html program to demonstrate the use of class**.**

Lab No. 9: Adding JavaScript code to html page.
                    Finally merge all the laboratory work and develop simple web pages.

Reference books:
1. Bayross, Ivon – 2002 **Teach yourself web Technologies** -, BPB publications
2. Stevens Luke, 2012-1013 Edition, **THE TRUTH ABOUT THE HTML5**
3. Wiley, Chris Bates, **Web programming** Dreamtech India Pvt. Ltd
4. Jama Kris and King Konrad **HTML and Web designing** -, Tata McGraw Hill Publishing Ltd
5. Pfaffenberger, "**World Wide Web Bible**", BPB Publication
6. Mccoy, "**Mastering Web Design**", BPB Publication
7. Evans, "**10 Minute Guide to HTML**", Prentice Hall of India Limited (PHI)
8. Godbole S Achyut and Kahate Atul, "**Web Technologies**", Tata McGraw Hill
9. Xavier C., "**Web Technology & Design**", New Age International Publishers.
10. Navarro Ann, "**Effective Web Design**", BPB publications.
11. Kamal Raj, "**Internet & Web Design**", Tata McGraw Hill
12. Sharp Remy and Lawson Bruce, **Introducing HTML5**
13. Keith Jeremy, **HTML5 for Web Designers**
Web references
http://www.w3schools.com/html/default.asp
http://www.w3schools.com/css/default.asp
http://www.w3schools.com/javascript/default.asp
https://dev.w3.org/html5/html-author/
http://books.alistapart.com/

Second Year (First Semester)

Third Semester

Subjects:

1. EG 2104 SH   Engineering Mathematics III
2. EG 2112 CT   Data Structure & Algorithm
3. EG 2111 EX   Microprocessors
4. EG 2112 EX   Electronic Devices & Circuits
5. EG 2113 CT   Database Management System
6. EG 2114 CT   Computer Architecture

Engineering Mathematics III
EG 2104 CT

Total: 4 hours /week

Year: II   **Lecture: 3 hours/week**
Semester: I   **Tutorial: 1 hour/week**
                                           Practical: hours/week
                                           Lab: hours/week

Course description:

This course consists of Partial derivative, Differential equations, Infinite series, Fourier series, and Elementary group theory necessary to develop mathematical background.

Course objectives:

After completing this course students will able to:
1. Provide the basic mathematical idea for the analysis of electronic circuits and
2. Help in the development of program for the technical applications

Course Contents:

Unit 1 Partial Derivative: **[8 Hours]**

    1.1   Functions of more than one variables
    1.2   Partial derivative, partial differential coefficient.
    1.3   Partial derivative of first and higher order.
    1.4   Homogeneous function and Euler's Theorem on homogeneous functions.
    1.5   Composite function, Derivative of composite functions.(Total differential coefficient)

Unit 2 Differential Equations: **[10 Hours]**
    2.1   **Ordinary Differential Equations**
        1.1.1   Differential Equation and its order and degree.
        1.1.2   Differential Equations of first order and first degree,
        1.1.3   Differential Equations with separate variables,
        1.1.4   Homogeneous and exacted differential Equations
    2.2   **Partial Differential Equations (PDF)**
        2.2.1   Basic concepts, definition and formation
        2.2.2   General solution of linear PDF of first order (Pp + Qq = R form)

Unit 3 Infinite Series: **[11 Hours]**
    3.1   Definitions of sequence and infinite series,
    3.2   Condition for convergence of an infinite series,
    3.3   Geometric series.
    3.4   Test of convergence. (p-test, D' alembert's ratio test, Cauchy radical test or root test)
    3.5   Power series and its interval of convergence,
    3.6   Expansion of functions using Taylor's and Maclaurin's theorems.

Unit4. Fourier Series: **[8 Hours]**
    4.1   Periodic function,
    4.2   Even and odd function
    4.3   Trigonometric series
    4.4   Fourier series of the functions of period 2π,
    4.5   Euler's formula,

Unit 5. Elementary Group Theory: **[8 Hours]**

    5.1.   Binary operation, Binary operation on sets and their properties.
    5.2.   Definition of group
    5.3.   Group whose elements are not number
    5.4.   Finite, Infinite group and Abelian group
    5.5.   Elementary properties of group.

References:
1. Thomas and Finney, *Calculus and Analytical Geometry*, Narosa Publishing House, New Delhi, 1990.
2. E. Kreyszig, *Advanced Engineering Mathematics*, Wiley-Easter Publication, New Delhi, 1990.
3. Chandrika Prasad, *Mathematics for Engineer*, Prasad Mudranalaya, Allahabad, 1996.
4. E. Kreyszig, *Advanced Engineering Mathematics*, Wiley-Easter Publication, New Delhi, 1990.
5. A.V. Oppenheim, *Discrete-Time Signal Processing*, Prentice Hall, India Limited, 1990.
6. K. Ogata, *Discrete-Time Control System*, Prentice Hall, India Limited, 1993.

Data Structure & Algorithm
EG 2112 CT

Total: 7 hour /week

Year: II

Semester: I

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: hours/week

Lab: 3 hours/week

Course Description:

This course deals with the basic fundamentals of Data Structures and Algorithms. Students will learn how to model data in a computer, how to specify and use standard ADTs, and how to implement such ADTs with standard data structures and will learn how efficient or expensive various combinations of data structures and algorithms are.

Course Objectives:

After completing this course the student will be able to:
1. Learn how the choice of data structures and algorithm design methods impacts the performance of programs.
2. Implementing ADTs such as stacks, queues, lists, trees, and algorithms such as searching, and sorting

Course Contents:

Unit 1. Introduction: **[3]**
    1.1   Abstract Data Type
- Definition
- Methods of Specifying ADT
- Importance of data structure

    1.2   Tools for algorithm analysis (Big Oh Notation)

    1.3   Array Data Structure
- Multidimensional Array
- Basic Array operation

Unit 2. Stack and Queue: **[6]**
    2.1   Stack as an ADT and Operation
- Continuous implementation of Stack with varying and fixed TOS

    2.2   Application of Stack
- Converting Infix to Post fix expression
- Evaluating Post Fix expression

    2.3   Queue as an ADT and Operation
- Definition
- Algorithm of Enqueue and dequeue
- Linear Queue
- Circular Queue
- Priority Queue
- Applications of Queue

Unit 3. **Link list as an ADT:** **[8]**
    3.1   Definition
    3.2   Structure of link list
    3.3   Advantage and disadvantages of link list
    3.4   Operations in Singly Linked list
- Insertion at the beginning and end, after the node, before the node
- Deletion at the beginning and end, after the node, before the node

    3.5   Doubly linked list
- Definition
- Structure of doubly liked list
- Insertion at the beginning and end, after the node, before the node
- Deletion at the beginning and end, after the node, before the node
- Advantages and disadvantages

Unit 4. **Recursion:** **[3]**
    4.1   Definition
    4.2   Properties of recursion
    4.3   TOH and its solution
    4.4   Solution of Fibonacci sequence and factorial

Unit 5. **Trees:** **[6]**
    5.1   Tree concepts
    5.2   Binary tree
    5.3   Application of binary tree
    5.4   Node representation
    5.5   Operation in Binary Tree
- Insertion
- Deletion

    5.6   Algorithm of tree search
    5.7   Tree traversals
- Pre order
- In order
- Post order

    5.8   Height, level and depth of tree and its importance
    5.9   AVL balance tree
- Definition
- Detection of unbalance
- Single and double rotation in balancing

    5.10   B-tree
- Definition
- Structure of B tree
- Applications

Unit 6. **Sorting:** **[6]**
    6.1   Definition
    6.2   Types of sorting
- Internal and external

    6.3   Algorithm of bubble sort
    6.4   Algorithm of insertion sort
    6.5   Algorithm of selection sort
    6.6   Algorithm for Quick sort
    6.7   Algorithm for Merge sort

Unit 7.   **Search:**   **[6]**

       7.1   Definition
       7.2   Sequential search
       7.3   Binary search
       7.4   Hashing
- Definition
- Hash function and hash table
  - Introduction to Hash collision prevention

Unit 8.   **Graph:**   **[7]**

       8.1   Definition
       8.2   Components of Graph
       8.3   Vertices and edges
       8.4   Directed and Undirected
       8.5   Connected and Unconnected
       8.6   Path and Cycle
       8.7   Adjacency sets and tables
       8.8   Array based representation
       8.9   Linked based and mixed implementation
       8.10   Graph traversal and spanning forests
- Forest and tree
- Tree edges
  - Forward edges
  - Cross edges
  - Back edges
- Algorithm of graph traversal
  - Depth First traversal
  - Breadth First traversal

Practical: **[45]**

1. Implement stack using array
2. Implement linear and circular queue
3. Solve TOH & Fibonacci sequence using recursion
4. Implement linked list: singly and doubly
5. Implement of trees
6. Searching techniques that were covered in the course Searching techniques that were covered in the course Implement graphs: graph traversal
7. Implement Hashing

References books:
 1 .Agarwal, U. (2012). Data Structure Using C. (3rd ed.). : S K Katari & Sons.
 2. Tenenbaum, A.M, Langsam, Y & Augustein, M.J. (1996). Data Structure Using C and C++. (2nd ed.). India: Prentice Hall India.
 3.Sahni, S. (2002). Data Structures, Algorithms and Applications in C++. (2nd ed.). India: University Press.

Microprocessors

EG2111 EX

Total: 7 hour /week

Year: **II**
Semester: **I**

Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week
Lab: hours/week

Course Description:

This course deals with fundamentals of microprocessor, basic low level microprocessor programming, interfacing and introduction to basic programmable devices.

Course Objectives:

After completing this course the students will be able to:
1. understand the working principle of a computer
2. understand the working principle of microprocessor
3. understand the process of writing and executing low level language
4. know how to interface devices with a computer

Course Contents:

Unit1.   Introduction to Microprocessor: **[8]**
    1.1.   History of computer development
    1.2.   Analog and digital computer
    1.3.   Microprocessor, microcomputer, microcontroller
    1.4.   Stored program concept and von-Neumann's architecture
    1.5.   General architecture of a microcomputer system showing control buses
    1.6.   History of x85 microprocessors
    1.7.   Block diagram of a typical microprocessor and microcontroller
    1.8.   Programming languages
    1.9.   Instruction set of microprocessors
    1.10.   Introduction to Simple as Possible (SAP1, SAP2, SAP3) computers

Unit2.   Microprocessor architecture and the instruction set: **[8]**
    2.1.   Internal architecture of 8085 microprocessor
    2.2.   Pin description of 8085
    2.3.   8085 Register set
    2.4.   Instruction and data formats
    2.5.   Instruction classifications: Data transfer, arithmetic, logical, branch, machine control
    2.6.   Instruction set of 8085
    2.7.   Addressing modes in 8085

Unit3.   Assembly language programming for 8085:   **[9]**
    3.1.   Introduction to assembly language and assemblers
    3.2.   Simple assembly language programs (use of registers, addition, subtraction, Multiplication and Division).
    3.3.   Programs using loops, counters, delays
    3.4.   Subroutine and stack
    3.5.   Code conversion ASCII/BCD/Binary

Unit4. **Interfacing I/O and memory devices:** [10]
>   4.1.   8085 machine cycles and bus timing
>   - Fetch and execute cycles
>   - Memory read/write machine cycle
>   - I/O read/write machine cycle
>   4.2.   Address Decoding
>   - Unique and non-unique address decoding
>   - Address decoding for I/O and memory devices
>   4.3.   Interfacing I/O devices
>   - Interfacing Input Devices
>   - Interfacing Output Devices
>   - Address decoding using block decoders
>   - Interfacing Memory-mapped I/O
>   4.4.   Memory Interfacing
>   - Memory structure and its requirement
>   - RAM and ROM chips
>   - Address decoding using NAND and block decoders
>   4.5.   Introduction to Direct memory access and DMA controller

Unit5. **8085 Interrupt processing:** [6]
>   5.1.   Programmed I/O
>   5.2.   Interrupt Driven I/O
>   5.3.   The 8085 Interrupt
>   5.4.   Interrupt Processing in 8085
>   5.5.   8085 Vectored Interrupts
>   5.6.   Restart and software instructions

Unit6. **Introduction to general purpose programmable peripheral devices:** [4]
>   6.1. 8255 Programmable Peripheral Interface
>   6.2. 8254(8253) Programmable Interval Timer
>   6.3. 8259 Programmable Interrupt Controller
>   6.4. 8251 Universal Synchronous/Asynchronous Receiver/Transmitter

Practical: [45]
The practical exercise shall cover the low level program from simple programs for data transfer to complex programs for table processing
1. Familiarization through the 8085 microprocessor trainer kit
2. Perform data transfer operation using data transfer instructions
3. Perform arithmetic operation using arithmetic instructions
4. Perform logical operation using logical instructions
5. Perform conditional and unconditional branching operation
6. Programs involving loops and counters
7. Create programs that involves checking numbers
8. Perform BCD and ASCII manipulation program
9. Perform multiplication and division
10. Create programs to read and write from the port

Reference books:
1. Ramesh S. Gaonkar, "Microprocessor Architecture Programming and applications with 8085" Penram Internatinal Publishing Pvt. Ltd, sixth edition, 2013.
2. N.K Srinath, "8085 Microprocessor programming and interfacing", PHI Learning Pvt.Ltd., 2005.
3. John Uffenbeck, "The 8080, 8085 & Z-80 Programming, Interfacing and Troubleshooting", PHI Learning Pvt. Ltd.
4. Albert Paul Malvino, Jerald A. Brown, "Digital Computer Electronics", McGraw-Hill edition, third edition, 2008.
5. Barry B. Brey, "The Intel Microprocessors: Architecture, Programming & Interfacing" PHI, 6th Edition, 2003.
6. B Ram, "Microprocessor and Applications", New Age International Publishers, fourth edition, 2012.

Electronic Devices and Circuits

EG 2112 EX

Total: 8 hour /week

Year: II
Semester: I

Lecture: 4 hours/week
Tutorial: 1 hours/week
Practical: hours/week
Lab: 3 hours/week

Course Description:

This course deals with different electronic devices and circuits.

Course Objectives:

On completion of this course the students will be able to:

1   differentiate between passive and active components, understand their characteristics
2   identify and explain the working principles of various semiconductor devices, relate their characteristics and applications
3   explain the characteristics of CB, CE and CC configuration circuits

Course Contents:

Unit 1.   History of electronic devices: electron vacuum tubes: Diode, Triode and Pentode: **[2]**

Unit 2.   Basic Passive Devices: R, C and L: **[4]**
Construction, types, color coding and characteristics.

Unit 3.   Semiconductor Diodes: **[10]**
3.1   Energy levels, valence and conduction bands, conduction of electrons and holes.
3.2   Intrinsic and extrinsic semiconductor devices (Si), impurities, doping, majority and minor charge carries in P – type and N – type materials..
3.3   PN Junction and depletion layer and potential barrier – definition and characteristics.
3.4   Forward and reverse biasing of PN junction diode – The V-I characteristic, principles of operation, and effects of temperature and junction capacitance.
3.5   Analysis of PN junction diode circuit: The V-I characteristic and mathematical expressions with equivalent model circuit diagrams.
3.6   Operation in the reverse breakdown region- Zener diode, principles of operation and IV characteristic.

Unit 4.   Power Supplies: **[6]**
4.1.   Half wave and full wave rectifiers – Types, working principles, characteristics and applications.
4.2.   Analysis of simple DC voltage power supplies – Principles, characteristics and ripple (voltages) factors.
4.3.   Simple voltage regulation using Zener diodes – Principles, circuits, characteristics and application.

Unit 5. **Bipolar Junction Transistors (npn and pnp) – Types, construction, working principle as an amplifier and characteristics:** **[14]**
    5.1. Classification of amplifiers: CB, CE and CC amplifier circuits – Working principles, basic circuits to investigate input and output V-I characteristic and their results.
    5.2. Other characteristics of BJT – Saturation and cutoff modes: Definition, circuits, principles and characteristics.
    5.3. Types of amplifier circuits: Class A, Class B, Class AB and Class C – Definition, characteristics and applications.
    5.4. Specifications and data book.

Unit 6. **Field Effect Transistor (JFET and MOSFETS) – Types, construction, working principles as an amplifier and characteristics:** **[12]**
    6.1. Basic circuits for the analysis of input and output V-I characteristiccurves – Working principles, characteristics and applications.
    6.2. Saturation, cut off breakdown and ohmic regions of operation – analysis of V-I characteristic curves.
    6.3. Specifications and data book.

Unit 7. **Special Semiconductor Devices – Working principles, functional circuits, characteristics and applications:** **[12]**
    7.1. UJT, PUT, SCR, Diacand Triac.
    7.2. Photo voltaic effects and solar cells.
    7.3. Photodiode, phototransistor, LED, LDR, optocouplers and isolators.
    7.4. Tunnel diode, schottyky diode, GaAs Transistors, MOSFET.
    7.5. Charge coupled devices, Hall effects, solid state relay and thermister.
    7.6 Multivibrators: Generation of square and triangular wave forms

Practical: **[45]**
    1 Observe Diode characteristics – PN diode and Zener diode
    2 BJT characteristics – C.E. input and output characteristics
    3 FET characteristics – C.S. input and output characteristics
    4 HW and FW rectifier – waveforms and characteristics
    5 UJT characteristics – IV characteristics
    6 PUT characteristics – IV characteristics
    7 SCR characteristics – IV characteristics
    8 Tunnel diode characteristics – IV characteristics
    9 Photo diode characteristics – IV characteristics

Reference books:
1. Theraja, B.L. Basic Electronics Solid State. S. Chand Limited, India. 2007.
2. Sharma, S. Electronic Principles. S.K. Kataria & Sons, India.
3. Floyd, T.L. Electronic Devices. Prentice Hall. 2011
4. Malvino, A. P. Principles of Electronics. McGraw-Hill Higher Education.2006
5. Hughes, E. Electrical and Electronic Technology.Prentice Hall; 2008.

Database Management System
EG 2113 CT

Total: 6 hour /week
Year: II   **Lecture: 3 hours/week**
Semester: I   **Practical: 3 hours/week**

1. Course Introduction
The purpose of this course is to introduce the fundamental concepts of database management, including aspects of data models, database languages, and database design. At the end of this course, a student will be able to understand and apply the fundamental concepts required for the use and design of database management systems.

2. Objectives
Through this course, students will be able to:
- become proficient at modeling databases at conceptual and logical levels of design,
- develop database schemas with principled design that enforce data integrity,
- become knowledgeable in the creation, altering, and manipulation of tables, indexes, and views using relational algebra and SQL,
- become proficient at casting queries in SQL,
- write database application programs with an understanding of transaction management, concurrency control, and crash recovery.

3. Contents
Unit I: Introduction to Database System   [7]
1.1. Basic Terminologies: Data vs Information, Data Hierarchy, Database, Database Management System, Database System, Relational Database Management Systems.
1.2. Data Management Approaches: File Management Systems, Database Management Systems, Limitations, Advantages, and Applications.
1.3. Database Schema and Instance, Data Abstraction (views of Data), Data Independence, Database Languages, Database Users and Administrator, Transaction Management.
1.4. Data Models: Hierarchical, Network, Entity Relationship, Relational, and object oriented data model

Unit II: Entity Relationship Data Modeling [8]
2.1. ER Model and ER Diagrams, Components of ER Model, Types of Attributes.
2.2. Degree of Relationship, Constraints on ER Model (Mapping Cardinalities and Participation Constraints), Keys and Types of Keys, Weak Entity Sets
2.3. Relational Model: Introduction, Structure of Relational Databases, Schema Diagram, Mapping ER Model to Relational Database.

Unit IV: Structured Query Language   [10]
4.1. Introduction: Basic Structure of SQL Query, SELECT, FROM and WHERE clause, Using Multiple Relations
4.2. Set Operations, Strings and Pattern Matching, Ordering the Display of Tuples, Join Operations: Join Types and Join Conditions.
4.3. Nested Queries: Set membership Test, Set Comparison and Test for Empty Relations.
4.4. Aggregate Functions, Group by Clause and Having Clause
4.5. Database Modifications: Insert, Delete and Update Operations
4.6. Data Definition Language: Domain Types in SQL, Create, Alter and Drop statements, View and Modification of Views, Embedded and Dynamic SQL

Unit V: Integrity Constraints [5]

5.1. Concept and Importance of Integrity Constraints, Data Integrity.
5.2. Domain Constraints: Not Null Constraints, Unique Constraints, Primary key Constraints, Check Constraints.
5.3. Referential Integrity: Using Referential Integrity, Cascading Actions
5.4. Assertions and Triggers: Creating and Deleting Assertions, Creating and Deleting Triggers, Assertions vs Triggers.

Unit VI: Relational Database Design [5]

6.1. Introduction, Database Modification Anomalies, Functional Dependencies (FDs), Types of FD's, FD Inference Rules.
6.2. Closure of Set of FD's, Closure of Set of Attributes, Covers.
6.3. Normalization: Purpose and Concept of Normalization, Forms of Normalization: 1-NF, 2-NF, 3-NF, BCN

Unit VII: Authentication and Authorization [4]

7.1. Authentication vs, Authorization, Classification of DB Security, Levels of DB Security.
7.2. Types of Authorization, Creating Users, Granting and Revoking Authorizations in SQL, CASCADE and RESTRICT
7.3. Concept of Roles, Authorization using Roles.

Unit VIII: Advanced DBMS Concepts [6]

8.1. Indexing: Concept of Indexing, Index File vs Data File, Index key Structure, Types of Indices: Ordered vs Unordered Indices, Primary vs Secondary Indices, Primary Indices: Dense and Sparse Indices with their Strengths and Drawbacks, Indexing Evaluation.
8.2. Transactions and Recovery: Concept of Transaction & Properties, Transaction States, Concurrency, Need of concurrency Control, Reasons of Failure, Concept of Recovery

Laboratory Work

− Student should design ER diagrams of organization or particular subsystem within the organization by using tools like Visio or any other
− Covert ER diagrams into relational model and database schema should be created by using DDL. Practice Create, drop and alter commands
− Populate the relations with some   data and write some queries that cover all features of DML discussed in class. Practice, insert, delete, update and select commands.
− Create views and indices for the database.

References

• Silberschatz, H.F. Korth, and S. Sudarshan, Database System Concepts, 6th Edition, McGraw Hill, 2010
• Saud Arjun, Saud Bhupendra, Foundation of Database Management System, Kirti Books and Publishers Pvt. Ltd., 2014
• Raghu Ramakrishnan, and Johannes Gehrke, Database Management Systems, 3rd Edition ,McGraw-Hill, 2007
• Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 6th Edition, Pearson Addison Wesley; 2010.

Computer Architecture

EG 2214 CT

Year:　　II
Semester:　I

Total: 7 hour /week
Lecture: 4 hours/week
Tutorial:　hours/week
Practical: 3 hours/week
Lab:　hours/week

Course Description:

This course is an introduction to computer architecture and organization. It covers topics in both the physical design of the computer (organization) and the logical design of the computer (architecture).

Course Objectives:

After completing this course the student will able to:
1. explain the overview of computer organization
2. explain the principle of CPU system
3. explain the principle of memory system
4. explain the principle of data flow

Course Contents:

Unit 1. Basic computer architecture: [7]

   1.1 Introduction
- Introduction of Computer Architecture
- Overview of computer organization
- Difference Between Computer Architecture and organization

   1.2 Instruction codes
- Stored program organization-Indirect address
- Computer Registers
- Common bus system
- Computer instruction
- Instruction set

   1.3 Timing and Control-Instruction Cycle:
- Fetch and decode
- Limiting errors

   1.4 Type of Instruction
- Register reference Instruction
- Memory reference instruction
- Input and output interrupt

Unit 2. Control Unit: [10]

  2.1 Basic Computer Design of Accumulator
- Control of AC register
- Adder and logic circuit
- ALU organization

  2.2 Control Memory-Address Sequencing
- Conditional Branching
- Mapping of Instruction-Subroutines

  2.3 Micro program
- Symbolic Micro program
- Binary Micro program

2.4 Design of control unit
- Basic requirement of control unit
- Structure of control unit
- Hard wired control unit
- Micro program sequencer

Unit 3. Central processing Unit: [12]

3.1 General Register Organizations:
- Control word. Stack organization. Instruction
- Formats-Addressing Modes

3.2 Data transfer and Manipulation:
- Data Transfer Instructions
- Data Manipulation Instructions
- Arithmetic Instructions
- Logical and Bit Manipulation Instructions
- Shift Instructions.

3.3 Program control:
- Status bit conditions
- Conditional Branch Instructions
- Subroutine Call and Return
- Program Interrupt
- Types of Interrupts.

3.4 Reduced Instruction set:
- Computer (RISC):
- CISC Characteristics
- RISC Characteristics
- Overlapped Register
- Windows-Berkeley RISC I.

Unit 4. Computer arithmetic [7]

4.1 Addition and Subtraction:
- Hardware Implementation-
- Hardware Algorithm
- Addition and Subtraction with Signed-2's Complement

4.2 Data Multiplication Algorithms:
- Booth Multiplication Algorithm
- Array Multiplier.

4.3 Division Algorithms:
- Divide overflow
- Hardware Algorithm
- Floating Point Arithmetic Operations
- Basic considerations-Register Configuration

Unit5. Memory System [7]

5.1 Memory concept
- Main Memory-
- Auxiliary Memory
- Associative Memory:

5.2 Memory Hardware Organization
- Match Logic-
- Read operation and Write operation.
- Cache memory

- Associative Mapping
- Direct Mapping
- Set-Associative Mapping
- Writing into Cache-Cache Initialization.
- Virtual Memory-Address space and Memory space-

5.3 Address mapping Using Pages
- Associative Memory page table
- Page Replacement-Memory Management Hardware
- Segmented-Page Mapping-

Unit 6. I/O Organization [7]

6.1 Peripheral Devices

6.2 I/O Module

6.3 I/O Interface
- I/O Bus and Interface Modules
- I/o versus Memory Bus
- Isolated versus Memory-Mapped I/o
- Example of I/o interface

6.4 Mode of Transfer:
- Programmed I/O,
- Interrupt Driven I/O,
- DMA

6.5 I/O Processor
- CPU-IOP Communication

6.6 Concept of Data Communication Processor (DCP)

Unit 7. Pipeline, vector processing and multiprocessors: [10]

7.1 Parallel Processing
- Pipeline -Arithmetic
- Pipeline-Instruction

7.2 Pipeline Examples
- Four Segment Instruction Pipeline-
- Data Dependency
- Handling of Branch Instructions.
- RISC Pipeline
- Three Segment Instruction
- Delayed load-Delayed branch.

7.3 Vector Processing:
- Vector operations-
- Matrix Multiplication-
- Memory Interleaving-
- Super computers. array processors:
- Attached Array Processor- SIMD Array processor.

7.4 Concept of Multiprocessor

Practical: [45]

8085 Assembly Language program:
1. Multi byte Addition and Subtraction
   Multi byte decimal addition and subtraction
2. Adder and substractor circuit
3. Study of 8259 programmable interrupt controller - Development of interrupt service routine
4. Keyboard/display controller- Keyboard scan- blinking and rolling display
5. Parallel data transfer
6. Study of Microcomputer development system

Text books:

1. M. Morris Mano (1993), Computer System architecture, Prentice Hall.

Reference books:

1. William Stallings, Computer Organization and Architecture, Pearson, 9th Edition
2. Hamacher.V.C., Vranesic Z.G and Zaky.S.G (1990), Computer Organisation, McGraw Hill, New York, III Edition.
3. Hayes (1998)," Computer System Architecture", McGraw Hill.
4. John D. Carpinelli, Computer System Organization and Architecture, Pearson.
5. David A. Patterson, John L. Hennessy, Computer Architecture and Design, 5th Edition

Fourth Semester

Subjects:

EG 2213 EX	Communication System
EG 2207 CT	Operating System
EG 2208 SH	Statistics & Probability
EG 2208 CT	System Analysis & Design
EG 2209 CT	Java Programming
EG 2210 CT	Web Technology II

Communication System

EG 2213 EX

Total: 8 hour /week

Year: **II**   **Lecture: 4 hours/week**

Semester: **II**   **Tutorial: 1 hours/week**

Practical: hours/week

Lab: 3 hours/week

Course Description:

This course is an introduction to basic communication system. It covers signal modulation schemes, radio transmitters, radio receivers, microwave communication, satellite communication equipment and the digital communication.

Course Objectives:

After completing this course the student will able to understand:

1. basic of communication principles
2. principle of signal modulation
3. about different transmission schemes
4. basic operation of radio transmission
5. principle of digital communication

Course Content:

Unit 1.   **Introduction:**   **[7]**
         1.1   Definition and Concept
- Wire and wireless communication principle
- Classification of telecommunication system
- Transmission methods: wire, fiber optics, microwave transmission, HF wireless, and satellite communication
- Manual Telephony

Unit 2.   **Signal Modulation:**   **[10]**
         2.1   Principle, definition, purpose of modulation process in information transmission
         2.2   Modulation methods, overview, basic characteristics, basic application of
- AM, FM,
- Single side band (SSB), independent side band (ISB)
- Pulse code modulation (PCM)

Unit 3.   **Radio Transmitters:**   **[10]**
         3.1   AM broadcasting transmitter, block diagram, operation and characteristics
         3.2   Basic stages and circuits of AM transmitter
         3.3   SSB radio communication transmitter, block diagram, operation and characteristics
         3.4   Basic stages and circuits of SSB transmitter
         3.5   FM broadcasting transmitter, block diagram, operation and characteristics

3.6   Basic stages and circuits of FM transmitter

Unit 4.   Communication Radio Receivers: **[5]**
    4.1   SSB communication receivers
       • Block diagram, circuits, operation, characteristics
       • Synchronization in SSB receiver
    4.2   FM communication receiver, Block diagram, circuits, operation, characteristics

Unit 5.   Microwave communication: **[8]**
    5.1   introduction, advantages and propagation characteristics
    5.2   microwave relay system (link), basic diagram, function characteristics, and applications
    5.3   microwave technology components

Unit 6.   Satellite Communications Equipment: **[10]**
    6.1   introduction, basic block diagram, operation principles, characteristics, applications
    6.2   Antenna dish, construction, characteristics, alignment principle
    6.3   satellite multichannel receivers, block diagram, working principles, characteristics and specification

Unit 7.   Digital communications: **[10]**
    7.1   Basic principles, advantages of digital over analog communication system
    7.2   Digital communication techniques: PCM
    7.3   Digital carrier transmission

Practical: **[45]**
1. Properties of EM waves
2. Overview of AM
3. Overview of FM
4. Radiation pattern of various types of antennas
5. Studies of line codes, PCM
6. Field visit on communication company (Trans-receiver section; AM, FM, Radio broadcasting System; Satellite Communication Station, etc.)

Reference books:
1. D. Roddy, Electronics Communications, Prentice Hall Career and Technology, 1995
2. Gary M. Miller, Jeffrey S. Beasley, Modern Electronics Communication, Prentice Hall, 2002
3. S. S. Haykin, M. Moher, Introduction to analog and digital communications, Wiley, 2007
4. B.P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, 1998
5. Leon Couch, Digital and analog communication system, Pearson, 2013

Operating System
EG2207 CT

Year: II
Semester: II

Total: 7 hour /week
Lecture: 4 hours/week
Tutorial: hours/week
Practical: 2 hours/week

1. Course Introduction
This course demonstrates basic features of operating system components. It describes process management, deadlocks and process synchronization, memory management techniques, File system implementation, and I/O device management principles.

2. Objectives

At the end of this course the students should be able to:
- Describe need and role of operating system.
- Explain OS components such a scheduler, memory manager, file system handlers and I/O device managers.
- Analyze and criticize techniques used in OS components
- Demonstrate different algorithms used by Operating Systems

3. Course Content

Unit I: Overview [6]
1.1. Definition, Two views of operating system, Evolution of operating system, Types of OS.
1.2. System Call, Handling System Calls, Types of System Call, Modes of Operating Systems
1.3. Operating System Structure, The Shell, Open Source Operating Systems

Unit II: Process Management [14]
2.1. Process vs Program, Multiprogramming, Process Model, Process States, Process Control Block, Threads, Thread vs Process
2.2. Inter Process Communication, Race Condition, Critical Section, Implementing Mutual Exclusion: Mutual Exclusion with Busy Waiting (Lock Variables, Peterson's Solution, Test and Set Lock), Sleep and Wakeup, Semaphore,
2.3. Process Scheduling: Goals, Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling), Evaluating Scheduling Algorithms

Unit III: Process Deadlocks [8]
3.1. Introduction, Preemptable and Nonpreemptable Resources, Resource – Allocation Graph, Conditions for Deadlock
3.2. Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance (Safe and Unsafe States, Bankers Algorithm for Single and Multiple Resource Instances) , Deadlock Detection (For Single and Multiple Resource Instances), Recovery From Deadlock (Through Preemption and Rollback)

Unit IV: Memory Management [14]
- 4.1. Introduction, Monoprogramming vs Multiprogramming, Multiprogramming with fixed and variable partitions
- 4.2. Memory management (Bitmaps & Linked-list), Memory Allocation Strategies
- 4.3. Virtual memory: Paging, Page Table, Page Table Structure, Handling Page Faults
- 4.4. Page Replacement Algorithms: FIFO, Second Chance, LRU, Optimal, LFU.
- 4.5. Segmentation: Why Segmentation?, Drawbacks and Advantages

Unit V: File Management [8]
- 5.1. File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout.
- 5.2. Implementing Files: Contiguous allocation, Linked List Allocation, Linked List Allocation using Table in Memory, Inodes.
- 5.3. Directory Operations, Path Names, Directory Implementation, Shared Files
- 5.4. Free Space Management: Bitmaps

Unit VI: Device Management [10]
- 6.1. Classification of IO devices, Controllers, Memory Mapped IO, DMA Operation, Interrupts
- 6.2. Goals of IO Software, Handling IO(Programmed IO, Interrupt Driven IO, IO using DMA), IO Software Layers (Interrupt Handlers, Device Drivers)
- 6.3. Disk Structure, Disk Scheduling (FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK)

Laboratory Work
- Student should practice installation of operating systems like windows and Linux or Ubuntu
- Learn operation of Linux or Ubuntu.
- Write programs to demonstrate concepts of process and threads.
- Simulate some algorithms discussed in class. Algorithms to be simulated can be decided by instructor.

Reference books:
- Andrew S. Tanenbaum*, Modern Operating Systems*, PH1 Publication, Third edition, 2008
- *Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "*Operating System Concepts", John Wiley & Sons (ASIA) Pvt. Ltd, Seventh edition, 2005.
- *Harvey M. Deitel, Paul J. Deitel, and David R. Choffnes, "*Operating Systems", Prentice Hall, Third edition, 2003.

Statistics & Probability
EG 2208 SH

Year: **II**
Semester: **II**

Total: 4 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: hours/week
Lab: hours/week

Course Description:

This course deals with a practical knowledge of the principles and concept of probability and statistics and their application to simple engineering problems.

Course Objectives:

After completing this course the students will be able to:

1. understand the principles and concept of probability to simple engineering problems
2. understand statistics and their application to simple engineering problems

Course Contents:

Unit 1.   **Introduction:**   **[4]**
       1.1   Meaning and Definition of Statistics
       1.2   Importance and Scope of Statistics
       1.3   Limitation of statistics

Unit 2.   **Basic concept of Statistical Studies:**   **[6]**
       2.1   Types and Sources of data
       2.2   Population and Sample
       2.3   Methods of collection of primary and secondary data
       2.4   Problems of data collection

Unit 3.   **Organizing a Raw Data:**   **[6]**
       3.1   Data Classification (need, meaning, objectives and types)
       3.2   Construction of frequency distribution and its principles
       3.3   Presentation of data: Tabular presentation

Unit 4.   **Pictorial Representation of a Data Set:**   **[5]**
       4.1   Introduction
       4.2   Difference between Diagram and Graphs
       4.3   Bar diagram, Histogram, Pie diagram, Steam leaf display
       4.4   Graphical Representation of Data
       4.5   Limitation of Diagram and Graphs

Unit 5.   **Summarizing a Data set:**   **[8]**
       5.1   Introduction
       5.2   Central Tendency (mean, median, and mode)
       5.3   Variability of Dispersion (range, inter quartile range and standard deviation and coefficient of variation)

Unit 6.   Concepts of Probability: **[8]**
      6.1   Introduction of probability
      6.2   Definition of probability
      6.3   Basic terms of probability theory
      6.4   Additive and multiplicative law of probability
      6.5   Counting rule(permutation and combination)
      6.6   Conditional probability

Unit 7.   Theatrical probability distribution: **[4]**
      7.1   Random variables
      7.2   Binomial distribution
      7.3   Poisson distribution
      7.4   Normal Distribution

Unit 8.   Bivariate data analysis: **[4]**
      8.1   Introduction
      8.2   Correlation (Karl Pearson's Coefficient of Correlation)
      8.3   Linear regression

References books:
1. A Text book of Statistics – B.C. Bajracharya
2. Elementary Statistics – H. C. Saxena
3. Statistical Methods – Mrigendralal Singh
4. Jit S. Chandan: Statistics. Vikash Publishing House, Pvt. Ltd.
5. Shrestha, Sunity and Amatya, Sunil; Business Statistics, Budha Academic Publishers & Distributors Pvt. Ltd.
6. Levin, I. Richard and Rubin S. David; Statistics for Management, Prentice Hall of India
7. Bluman A.G., Elementary Statistics: A Step by Step Approach, 7th edition, McGraw-Hill, 2009
8. Navidi W., Statistics for Engineers and Scientists,3rd edition, McGraw-Hill, 2011
9. Mario F.Triola, Elementary Statistics, 11th edition, Pearson Addison Wesley, 2011.
10. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, 5th edition, Wiley, 2011
11. Tulsian, P.C. & Pandey, Vishal, ***Quantitative Techniques: Theory and Problems,*** Pearson Education, India.

System Analysis and Design

EG 22208 CT

Total: 7 hour /week

Year: II
Semester: II

Lecture: 4 hours/week
Tutorial: hours/week
Practical: 3 hours/week
Lab: hours/week

Course Description:

This course presents an introduction to system analysis and design techniques and its practical application in Information and Technology field.

Course Objectives:

After completing this course the student will able to:
1. understand the system development life cycle
2. provide a comprehensive framework for system development

Course Contents:

Unit 1. System analysis and design Overview: **[5]**
       1.1   Introduction to System
       1.2   Information System and its types
       1.3   System development Life cycle
       1.4   Design of an information system
       1.5   Role and attributes of system analyst
       1.6   Tools Used by System Analyst

Unit 2. Information Gathering :   **[7]**
       2.1   Source of information
       2.2   Strategy to gather information
       2.3   Methods of searching for Information
       2.4   Interview and Questionnaires techniques
       2.5   Case study:–Hostel Information System

Unit 3. System Requirements specification: **[7]**
       3.1   Example of system requirement specification
       3.2   Data Dictionary
       3.3   Steps use in system analysis
       3.4   Modularizing Requirements Specifications
       3.5   Conclusions

Unit 4. Feasibility Analysis: **[8]**
       4.1   Goals of the project
       4.2   Examining Alternative Solutions
       4.3   Evaluation Proposed solutions
       4.4   Cost-benefit analysis
       4.5   Return of Investment (ROI)
       4.6   Payback Period
       4.7   Feasibility Report
       4.8   System Proposal and its components

Unit 5. Data flow diagrams: **[8]**

      5.1   DFD' Symbols
      5.2   Describing a system with DFD
      5.3   Leveling of DFD
      5.4   Physical and Logical DFD with example

Unit 6.   **Logical Database design:**   **[7]**
      6.1   Entity-Relationship model
      6.2   Example of E-R model
      6.3   Normalization
      6.4   Example of Database Design

Unit 7.   **Input –Output Design:**   **[6]**
      7.1   Input form design
      7.2   Input screen Design
      7.3   Menu Design
      7.4   Output Design

Unit 8.   **Implementation:**   **[6[**
      8.1   System testing
      8.2   Software maintenance
      8.3   Training to users
      8.4   Documentation

Unit 9.   **Case Study:**   **[6]**

Practical: **[45]**
Visit well-established organization and perform system analysis and design of that organization and submit the report with performed on following task
     1. System Proposal
     2. Data Collection methods
     3. Requirement Analysis
     4. Feasibility Analysis
     5. Design of system
     6. System Implementation plan

Reference books:
1. V. Rajaraman, "Analysis and design of information Systems"
2. Elias M. Awad, "Systems Analysis and design"
3. Vinod Kumar Garg and S. Srinivasan , "Workbook on Systems analysis and design"
.

Java Programming
EG 2209 CT

	Total: 7 hour / week
Year: **II**	**Lecture: 4 hours / week**
Semester: II	**Practical: 3 hours / week**

1. Course Introduction

The purpose of this course is to introduce the concepts of Java programming including introduction, basic structure, classes and objects, inheritance, interfaces, packages, exception handling, and multithreading. At the end, students will be able to write computer programs using different features of Java Programming.

2. Objectives

The main objective of this course is to teach students the core concepts of Java programming so that they will be able to develop small to large programs using the concepts of Java.

3. Contents

Chapter 1: Introduction [3]
1.1. Java as a Programming Platform
1.2. Java Buzzwords
1.3. Java Applets and the Internet
1.4. Short History

Chapter 2: Fundamental Programming Structures   **[11]**
2.1. A Simple Java Program
2.2. Comments
2.3. Data Types
2.4. Variables
2.5. Operators
2.6. Strings
2.7. Input and Output
2.8. Control Flow
2.9. Big Numbers
2.10. Arrays

Chapter 3: Objects and Classes   **[10]**
3.1. Introduction to Object-Oriented Programming
3.2. Using Predefined Classes
3.3. Defining Your Own Classes
3.4. Static Fields and Methods
3.5. Method Parameters
3.6. Object Construction
3.7. Packages

Chapter 4: Inheritance [9]
4.1. Introduction
4.2. Extending a Class
4.3. Overriding Methods
4.4. Final Variables and Methods
4.5. Final Classes
4.6. Finalizer Methods
4.7. Abstract Methods and Classes

Chapter 5: Interfaces and Inner Classes [9]
5.1. Introduction,
5.2. Defining Interfaces,
5.3. Extending Interfaces,
5.4. Implementing Interfaces,
5.5. Accessing Interface Variables,
5.6. Inner Classes

Chapter 6: Exception Handling [6]
6.1. Dealing with Errors (The Classification of Exceptions, Declaring Checked Exceptions, How to Throw and Exception, Creating Exception Classes)
6.2. Catching Exceptions

Chapter 7: Multithreading [6]
7.1. What are Threads?
7.2. Interrupting Threads
7.3. Thread States
7.4. Thread Properties
7.5. Synchronization

Chapter 8: I/O and Java Applets [6]
8.1. I/O Stream
8.2. Read and Write Console
8.3. Concept of Applets
8.4. Embedding Applet to HTML File

Practical: [45 Hrs.]

1. Develop a flowchart, algorithm and Pseudo code with the concept of sequence iteration, loops
2. Installation of Java Tools.
3. Console program to demonstrate conditional and looping statements.
4. Demonstrate class, object, methods, constructor, and Inheritance,
5. Console program to demonstrate Class, Objects, Constructor and Methods.
6. Console program to apply the concept of inheritance and methods overriding.
7. Create and import Java Packages and Sub-Packages.
8. Console Program to implement and apply interface and inner classes.
9. Console Program to implement and apply the concept of Exception Handling
10. Console Program to implement and apply the concept of Multithreading
11. Create I/O Stream program.
12. Embed a Java Applet Program to a HTML File.

Recommended Books:

1. Core Java Volume-I Fundamentals Ninth Edition, Cay S. Horstmann, Gray Cornell, Pearson
2. The Java Programming Language, Fourth Edition, Ken Arnold, James Gosling, David Holmes
3. Programming with Java, A Primer, Third Edition, E Balagurusamy

Web Technology II
EG 2210 CT

Total: 7 hour /week

Year: II

Semester: II

Lecture: 4 hours/week

Tutorial: hours/week

Practical: hours/week

Lab: 3 hours/week

Course Description:

To be familiar with the advanced technique of web technology and web page design. The students will be familiar with recent software used in web technology.

Course Objectives:

After completing this course the students will be able to
1. understand the basic of web technology
2. understand the basic of server side scripting languages
3. understand the fundamentals of database, database engines, and their uses in web programming
4. become familiar with XML, AJAX and WCMS

Course Contents:

Unit 1. Web Server Concept: **[3]**

    1.1 Introduction to Web Server
    1.2 Concept of Dynamic Content
    1.3 Using control flow to control dynamic content generation
    1.4 Concept of Architecting Web Application

Unit 2. Over View of HTML and CSS[3]
    2.1 Basic Tag of HTML 4.0
    2.2 Introduction of HTML 5
    2.3 Review of CSS 3

Unit 3. Server Side Script: PHP   **[22]**
    3.1 Introduction of PHP
    3.2 Advantage of using PHP for web development
    3.3 PHP Installation, PHP Syntax & PHP Variable
    3.4 PHP Operators
    3.5 Conditional Statements : if (...else) statement, Switch statements
    3.6 PHP Loop: For statement, For each statement, While statement, Do While statement
    3.7 Arrays
    3.8 PHP Functions

3.9 Get & Post Variable

3.10   File Upload: Date, Include, File, File Upload

3.11   Cookies

3.12   Sessions

3.13   Exception and Error

Unit 4.   Object oriented concept and Database Connectivity[14]

4.1   Objects And Classes

4.2   Properties and Methods

4.3   Constructors and Destructors

4.4   Inheritance And Scope

4.5   Overwriting Methods

4.6   Private & Protected Properties

4.7   Database Connectivity

- Connecting Server Side Script to Database
- Making SQL queries
- Multiple Connections
- Building in Error Checking
- Creating SQL database with Server Side Script
- Fetching Data sets
- Displaying Queries in tables
- Building Forms and control form data using queries

Unit 5.   eXtensible Markup Language (XML):   [7]

5.1   Introduction

5.2   Features of XML: XML can be used with existing protocols, Supports a wide variety of applications, Compatible with SGML, XML documents are reasonably clear to the lay person

5.3   Structure of XML: Logical Structure, Physical Structure

5.4   XML Markup: Element Markup i.e (<foo>Hello</foo>), Attribute Markup i.e. (<!element.nameproperty="value">)

5.5   Naming Rules: used for elements and attributes, and for all the descriptors, Comments Entity

5.6   Declarations :<! ENTITY name "replacement text">

5.7   Element Declarations: <!ELEMENT name content>

5.8   Empty Elements: <!ELEMENT empty.element EMPTY>

5.9   Unrestricted Elements: <!ELEMENT any.element ANY>

5.10   Element Content Models : Element Sequences i.e. <!ELEMENT counting(first, second, third,fourth)>, Element Choices <!ELEMENT choose(this.one | that.one)>, Combined Sequences and Choices

5.11   Element Occurrence Indicators :-Discussion of Three Occurrence Indicators? (Question Mark)* (Asterisk Sign)+ (Plus Sign)

5.12   Character Content: PCDATA (Parseable Character data) <!ELEMENT text(#PCDATA),Document Type Declaration (DTD) and Validation

5.13   Developing a DTD: Modify an existing SGML DTD, Developing a DTD from XML Code, either automatically or manually

5.14   Viewing XML in Internet Explorer, Viewing XML using the XML Data Source Object.XSL (Extensible Style Sheet Language) or CSS (Cascading Style Sheet);

Unit 6.   Asynchronous JavaScript And XML(AJAX):   [2]

6.1   Basic Concept of AJAX

Unit 7.   PHP Web Design Framework   [12]

     7.1   Introduction of PHP framework

     7.2   Importance of Framework

     7.3   Framework: Basic DB & Client Side Validation

     7.4   Framework: Session & Email System

     7.5   DB Normalization

     7.6   Framework with Methods, Classes & Cookeries

Practical: [45]

1. Installing required software and platforms for local servers and scripting (IDE, XAMPP, WAMPP, LAMPP etc.)
2. Simple programs using;
    2.1 Control and loops
    2.2 Strings
    2.3 Arrays
    2.4 Functions
3. Passing Information between pages
4. Forms handling, validation etc.
5. Writing to file, reading from file and file upload
6. Examples of sessions and cookies
7. Connecting to database
8. Using various queries on database to extract, insert, update and delete from the web interface
9. Using XML markup elements and its attributes
10. Concept of using simple AJAX in webpage
11. Design and develop a dynamic web page which should include database

References books

1. Bayross "*Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI*" BPB Publication
2. Hornberger Allen, "*Mastering in PHP*", BPB Publication
3. Converse and Park with Morgan "*PHP MYSQL Bible*" WILEY Publication
4. Sybex "*ASP, ADO and XML Complete*" BPB Publication
5. Russell "*Mastering Active Server Pages* " (BPB)
6. Ross Bay Ivan, "*HTML, DHTML, Java script, Perl CGI*" , BPB Publication

Third Year (First Semester)

Fifth Semester

Subjects:

EG 3109 CT   Computer Networks

EG 3110 CT   Computer Graphics

EG 3111 CT   Visual Programming

EG 3112 CT   Software Engineering

EG 3113 CT   PC Troubleshoot & Maintenance

EG 3114 CT   Elective – I

         a. Geographical Information System
         b. Cloud Computing
         c. Management Information System
         d. Data Mining

EG 3115 CT   Minor Project

Computer Networks
EG 3109 CT

Year: III
Semester: I

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: hours/week
Practical: 3 hours/week
Lab: hours/week

Course Description:

This course deals with fundamentals of computer network, its architecture, its standards and protocols used in computer network.

Course Objectives:

After completing this course the students will be able to:

1. understand the architecture of computer network
2. know various hardware devices and software used in computer networks
3. setup small home/office networks

Course Contents:

1. **Introduction to computer network:** **[2]**
    1.1. Introduction, definition, features, issues
    1.2. Applications of computer networks

2. **Network architecture:** **[6]**
    2.1. Network topologies
    2.2. Network types: LAN, MAN, WAN, Extra-net, Intra-net, Inter-net
    2.3. Layered network architecture, protocols, interfaces, services
    2.4. OSI Reference model
    2.5. TCP/IP Reference model
    2.6. Standardization organizations

3. **Network hardware and software:** **[3]**
    3.1. Network workstation and server: hardware and software requirements
    3.2. Client server and peer-to-peer model
    3.3. Network devices: Repeater, Hub, NIC, Bridge, Switch, Router, Gateway

4. **Physical layer:** **[4]**
    4.1. Channel bandwidth and throughput; propagation time, transmission time
    4.2. Transmission media
        ▪ Guided: coaxial, twisted-pair, fiber-optic
        ▪ Unguided: radio, microwaves, infrared
    4.3. Introduction of Frame Relay, ATM, ISDN, PSTN and X.25

5 **Data link layer:** [6]
 5.1. Introduction to data link layer and its issues
 5.2. Framing
 5.3. Flow control at data link layer
 5.4. Piggybacking and Sliding Window Protocol
 5.5. Error control issues at data link layer
 5.6. Error Detection Method and Error Correction Method
 5.7. Data link layer protocols: HDLC, PPP

6 **LAN architecture/standards:** [5]
 6.1. Introduction to LAN standards and architecture
 6.2. Media access control, MAC address
 6.3. ALOHA, FDDI, VLAN,CSMA/CD, Token ring, Token bus and IEEE 802.3, 802.4, 802.5
 6.4. Introduction to wireless LAN, Bluetooth, Wi-Fi, Wi-Max

7 **Network Layer:** [8]
 7.1. Internetworking
 7.2. Switching: Circuit switching and packet switching
 7.3. Addressing issues at network layer
 7.4. IP address; Different classes; Private and Public address
 7.5. Subnet mask and Subnetting; Classless addressing; Network address translation (NAT)
 7.6. Routing and its necessity; static and dynamic routing; interior and exterior routing
 7.7. Distance Vector Routing and Link State Routing Algorithm
 7.8. Introduction to dynamic routing protocols: RIP. IGRP, OSPF
 7.9. Network layer protocols: ARP, RARP, IP, ICMP
 7.10.　　 Limitation of IPV4, Transition from IPV4 to IPV6: Dual stack, Tunneling, Header Translation
 7.11.　　 Introduction to IPv6 and its necessity

8 **Transport layer:** [4]
 8.1. Transport layer issues: Congestion control, Flow control, Quality of service
 8.2. Transport layer addressing, sockets, Port
 8.3. Segmentation and reassembly
 8.4. Connection oriented and connectionless service
 8.5. Transport layer protocols: TCP, UDP

9 **Application Layer:** [4]
 9.1. Application layer and its function
 9.2. Electronic mail: SMTP, POP3, IMAP
 9.3. File transfer: FTP, PUTTY, WinSCP
 9.4. Dynamic host configuration protocol (DHCP)
 9.5. DNS, HTTP,HTTPS, WWW

10 **Network security:** [3]
 10.1.　　 Properties of Secure Communication
 10.2.　　 Cryptography: Symmetric key and public key, Digital signature
 10.3.　　 Firewalls
 10.4.　　 Virtual private network

Practical: [45]

In practical, students should be able to set up small networks. Also, they should be able to configure network hardware and network software. Following lab exercises may be helpful.

1. Installation of network interface card and various network devices like hub, switch, router etc.
2. Cabling: construction of straight-through and cross-over cable and verify the physical layer connectivity
3. Installation and configuration of workstation PC
4. Setup peer-to-peer networking and verify it
5. Install and configure server for client server networking; also verify it
6. Familiarization with basic network commands: Observing IP address and MAC address, Setting IP address and default gateway in PC, Verifying network layer connectivity
7. Configure the PC to obtain IP from DHCP, Release the leased IP, Renew IP (for this there should a DHCP server)
8. Create multiple networks and route packets across multiple networks using static routing
9. Dynamic routing (e.g. RIP) and default route
10. Configure HTTP, FTP, DHCP server and verify it
11. Configuration of DNS and e-mail server
12. Design of local area network (LAN)
13. Case study: Organizational visit to study existing network system

References books:

1. Andrew S. Tanebaum, David J. Wetherall, Computer Networks, 5th Edition
2. James F. Kurose, Keith W. Ross, Computer Networking – Top Down Approach, 4th Edition
3. Sanjay Sharma, Computer Networks
4. Behrouz A. Forouzan,"Data Communications and Networking".

Computer Graphics
EG3110 CT

Total: 6 hour /week

Year: III   **Lecture: 3 hours/week**
Semester: I   **Practical: 3 hours/week**

Course Description:

This course deals with graphics hardware, two and three dimensional graphics, fundamentals of animation techniques; graphical user interface design, web graphics design and graphics design packages.

Course Objectives:

After completing this course the students will be able to:
1   acquire the knowledge of computer graphics and get familiarize with hardware involved in graphics.
2   Understand Algorithms to generate two and three-dimensional graphical objects and animations.

Course Contents:

Unit 1.   Introduction: **[4]**

      1.1   History of Computer Graphics,
      1.2   Application of Computer Graphics
      1.3   CAD and CAM

Unit 2.   Graphics Hardware: **[7]**

      2.1   Input hardware- Mouse (Mechanical and Optical), Keyboard, Light pen, Touch panel (Optical, Sonic, and Electrical), Tablets (Electrical, Sonic, Resistive), Scanner
      2.2   Output hardware – Monitors, plotters, printers
      2.3   Raster and vector display technology – principles and characteristics
      2.4   Raster display – Monochromatic and color CRTs

Unit 3.   Two-Dimensional Graphics: **[7]**

      3.1 Line drawing methods – DDA and Bresenham algorithms
      3.2   Circle and ellipse drawing algorithms
      3.3   Review of matrix operations – addition and multiplication
      3.4   Two-dimensional transformations – translation, rotation, scaling and reflection

Unit 4.   Three-dimensional Graphics: **[12]**

      4.1   Projection of 3D objects onto 2D display devices
      4.2   Parallel and perspective projection
      4.3   3 D transformations – translation, rotation, scaling, refection
      4.4   Methods of 3D object representation–polygon tables and polygon surfaces
      4.5   Introduction to hidden lien and surface detection techniques
      4.6   Introduction to lighting models
      4.7   Introduction to shading models – constant shading, Gouraud shading and Phongshading

Unit 5.   **Fundamentals of Animation Techniques:**   **[4]**

   5.1   Animation sequences
   5.2   Key-frame and parameterized systems
   5.3   Morphing and simulating acceleration

Unit 6.   **Graphical User Interface Design:**   **[3]**

   6.1   Windows, icons, menu and other graphical interface items
   6.2   Principles of interactive user dialogs – managing skill levels, consistency, loading off memory, error handling, continuous feedback, default values, use of metaphors, color blindness

Unit 7.   **Web Graphics Design:**   **[4]**

   7.1   Introduction to graphics files formats
   7.2   Principles of web graphics design – browser safe colors, size, resolution, background, anti-aliasing

Unit 8.   **Introduction to Graphics Design Packages:**   **[4]**

   8.1   Type and purposes of graphics packages
   8.2   Desirable features of a graphics design package
   8.3   Examples of graphics packages and libraries

Practical: (List of Task for details practical)   **[45]**

As a part of the laboratory exercise, the students should implement all the algorithms studied in different chapters. At the end, students are required to integrate the codes they have written in earlier practical sessions to create a small project.

The lab contains few sessions dedicated to introduce the students to some of the popular professional graphics packages and CAD packages and explore their features. The course/lab instructor recommends packages to use.

Some algorithm implementation sessions may include:

   a.   Implementation of DDA and BLA
   b.   Implementation of circle and ellipse drawing algorithms
   c.   2D transformations
   d.   Projections
   e.   3D transformations.

References:

- James Foley, Andries van Dam, Steven Feiner, John Hughes, "Compute Graphics – Principles and Practice", Second Edition in C, Addison Wesley Publishing
- D. Hearn M. P. Baker, "Computer Graphics – C version", Second Edition, Prentice – Hall International, Inc.

Visual Programming
EG 3111 CT

Year: **II**

Semester: I

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: hours/week
Practical: hours/week
Lab: 3 hours/week

Course Description:

This course deals with the graphical user interface aspect of programming with event handling concept.

Course Objectives:

After completing this course the students will be able to ,
1   use the integrated development environment for program development
2   write visual programs with event handling
3   write visual programs with file handling and database management
4   understand the working of visual programs

Course Contents:

Unit 1.   Introduction: **[7]**
        1.1   Introduction of dot net framework
        1.2   Languages : VB.net and C#.net
        1.3   Why to choose dot net framework (dot net vs Java)
        1.4   The Integrated Development Environment
        1.5   The Elements of User Interface
        1.6   Event Driven Programming
        1.7   Properties, Methods and Events of Common Controls
        1.8   Developing Application (MDI, SDI)

Unit 2.   The Language Basics: **[9]**
        2.1   Data types
        2.2   Access modifiers (static, public, private, protected, internal)
        2.3   Variables, Constants and their scopes
        2.4   Expressions and Mathematical operators
        2.5   Type conversion (explicit/implicit)
        2.6   String and String buffer
        2.7   Array and Collections (Array list, Dictionary List)
        2.8   Loops and Conditions
        2.9   Procedures (Subroutine, Functions)
        2.10   Argument passing by reference and value
        2.11   Recursion

Unit 3.   The Form and Basic Controls :   **[11]**
        3.1   Creating forms
        3.2   Loading, closing, showing and hiding forms
        3.3   Label
        3.4   Textbox
        3.5   Command button
        3.6   Option button/check box/Frame

	3.7	List/Combo box
	3.8	Scrollbar
	3.9	Picture box/Image box
	3.10	Adding menu to form
	3.11	Timer
	3.12	Tree view and tree view controls
	3.13	The common dialog control
	3.14	Different properties, methods and events of form and controls
	3.15	Adding other active X controls

Unit 4.   Drawing: **[6]**
    4.1   The basic Drawing Objects
    4.2   Drawing shapes
    4.3   Drawing Methods
    4.4   Processing Image
    4.5   Transformation of pictures

Unit 5.   Working with files: **[5]**
    5.1   Opening test/binary files
    5.2   Closing files
    5.3   Sequential file access
    5.4   Random file access
    5.5   Storing and recovering information from file

Unit 6.   Working with database: **[7]**
    6.1   Introduction to database and Database Management Systems
    6.2   Creating tables and fields in database
    6.3   Using Visual database manager or access to create a database
    6.4   The data control and binding it with other controls
    6.5   Entering, validating and accessing fields in database
    6.6   Using ADO.net data objects in programming

Practical: **[45]**

The lab exercise shall cover the language basics, GUI design, use of different controls, drawing different shapes, file handling, Database programming, calling windows API etc using VB.net language.
1.   Overview of Visual Basic IDE
2.   Application Development using wizards
3.   Using Arrays in application
4.   Using subroutine and functions
5.   Creating and adding forms/menu in application
6.   Using basic controls such as text box, command button, combo box, list box etc in application
7.   Drawing lines, circles and other shapes
8.   Using files to store and retrieve data for application
9.   Using Active X Controls such as tree view, Rich Edit, Flex Grid, etc in application
10.   Use of DLL
11.   Using ADO.net to create database applications
12.   Using Windows API functions in VB 2008 application

References books:
1.   Evangelos Petroutsos, "Mastering Microsoft Visual Basic 2008" , Wiley India
2.   Micheal Halvorson, " Microsoft Visual Basic 2010", PHI
3.   Rod Stephen, "Visual Basic 2012 – Programmer Reference", Wrox

Software Engineering
EG 3112 CT

Year: **III**

Semester: **I**

Total: 5 hour /week

Lecture: 3 hours/week

Tutorial: hours/week

Practical: hours/week

Lab: 2 hours/week

Course Description:

This course aims to guide the students in both the theoretical and practical aspects of developing computer solutions for real-world problems. One will study the tools and techniques used in analysis and design of software systems, and apply those tools within a recognized software development methodology and within the context of a case study.

Course Objectives:

After completing this course the students will be able to:
1. understand the theory and foundations of software engineering
2. understand some key aspects of a software engineering process
3. apply fact-finding and problem-solving skills
4. determine the requirements for a software system
5. understand key aspects of models and processes for design of a software system
6. understand the process of analysis and design using the object-oriented approach
7. be aware of current trends in the area of software engineering

Course Contents:

Unit 1.   Introduction: **[4]**
    1.1   Software Engineering Fundamental
        - General definition
        - Program versus software
        - Software process
        - Software characteristics
        - Software applications
    1.2   Some terminologies:
        - Deliverables and milestones
        - Product and process
        - Measures, metrics and measurement
        - Software process and product metrics
        - Generic and customized software product
    1.3   Roles of management in software development
        - People, product, process and project

Unit 2.   Software Development Life Cycles Models: **[5]**
    2.1   Introduction to Software Development Life Cycle
    2.2   The waterfall model
    2.3   Prototyping model
    2.4   Iterative enhancement model

2.5	Spiral model	
2.6	Rapid application development model (RAD)	
2.7	Rational Unified process Model	
2.8	Agile Model: Scrum and XP methodologies	

Unit 3.   Software Requirement Analysis & Specification: **[5]**
3.1   Requirement engineering
3.2   Requirement elicitation
- Interviews
- Brainstorming series
- Use case approach

3.3   Requirement analysis
- Functional and non-functional requirement

3.5   Requirement documentation
- Nature of SRS
- Characteristics of a good SRS
- Organization of SRS

Unit 4.   Software Project Planning: **[6]**
4.1   Size estimation
4.2   Cost estimation
4.3   Models
4.4   The constructive cost model (COCOMO)
4.5   COCOMO II
4.6   Software risk management

Unit 5.   Software Design: **[6]**
5.1   Design concepts, importance and objectives
5.2   Modularity
- Cohesion
- Coupling
- Relation between cohesion and coupling

5.3   Strategy of design
- Bottom-up approach
- Top-down approach
- Hybrid approach

5.4   Function oriented design
5.5   IEEE recommended practices for software design
5.6   Object oriented design
5.7   UML 2.0

Unit 6.   Software Metrics: **[5]**
6.1   Software metrics: what & why?
6.2   Token count
6.3   Data structure metrics
6.4   Information flow metrics
6.5   Metrics analysis

Unit 7.   Software Reliability: **[4]**
7.1   Basic Concepts
7.2   Software quality

     7.3   Software reliability model
     7.4   Capability maturity model (CMM)

Unit 8.   Software Testing: **[6]**
     8.1   Software Verification and Validation
     8.2   Testing process
     8.3   Black box or functional testing
- Boundary value analysis
- Equivalence class testing
- Decision table based testing
- Special value testing

     8.4   White Box Testing or Structural testing
- Basic Path testing
- Cyclomatic complexity
- Control Structure testing
- Static Testing

     8.5   Levels of testing: unit, integration, system, user acceptance testing
     8.6   Debugging techniques, tools and approaches
     8.7   Testing tools

Unit 9.   Software Maintenance: **[4]**
     9.1   Introduction
     9.2   Maintenance process
     9.3   Maintenance model
     9.4   Estimation of maintenance costs
     9.5   Software Re-engineering
     9.6   Configuration management
     9.7   Documentation

Practical: **[30]**

The practical should contain all features mentioned above.

Case Study:
Visit well-established organization and perform as follows and submit the report.
     a) Define problem.
     b) Do requirement collections and perform feasibility analysis.
     c) Mention the life cycle model preferred.
     d) Show your planning for the project.
     e) Specify the design followed.
     f) Mention its reliability.

Recommended books:
1. Sommerville, Ian. *Software Engineering*, Addison-Wesley, ISBN 0-201-17568-1
2. Jones, Roger. *Software Engineering*.
3. Pressman, Roger S. *Software Engineering: A Practitioner's Approach*, McGraw Hill International Edition, 6th edition.
4. Ghezzi, Jayazeri and Mandrioli. *Fundamentals of Software Engineering,* Prentice-Hall
5. Pfleeger Shari. *Software Engineering: The Production of Quality Software,* Macmillan, ISBN 0-02-395115-X, 2nd Edition
6. Jawadekar Waman S. *Software Engineering principles and practice,* The McGraw-Hill Companies

PC Troubleshoot & Maintenance

EG 3113 CT

Year   : III   **Total: 7 hours / week**

Semester : I   *Lecture: 3 hours / week*

Tutorial: hour / week

Practical: 4 hours /week

Course Description:

This course deals with the fundamental concept, theories and popular principles of repair and maintenance of computer systems. The major focus is troubleshooting, repairing and maintenance of computer systems into real-life by utilizing the knowledge and skill of computer hardware and software.

Course Objectives:

At the end of the course student will be able to
1. Understand basic operation, classification and role of the computer
2. Maintain the computer, its accessories and peripherals
3. Take care of computer and its accessories against viruses and disasters

Course Contents:

Unit 1.   Introduction to Computer   [4]

      1.1   Definition of Computer
      1.2   Introduction to Data
      1.3   Introduction to Program
      1.4   Introduction to information
      1.5   Hardware and Software
      1.6   Classification of Computer
            1.6.1   Analog, Digital, Hybrid Computer
            1.6.2   Super, Mainframe, Micro-computer
            1.6.3   General and Special Purpose Computer
      1.7   Role of Computer
            1.7.1   Education
            1.7.2   Health, Industries
            1.7.3   Transportation
            1.7.4   Research
            1.7.5   Business
      1.8   Computer history and generation

Unit 2.   System Case: [2]

      2.1   Style and size
      2.2   Form Factors
      2.3   Switches
      2.4   LEDs
      2.5   Drive bay

Unit 3.   **Power Supply:**   **[2]**

      3.1   Ratings
      3.2   Working Principle
      3.3   Block Diagram
      3.4   SMPS Concept

Unit 4.   **Mother Board and System Devices:**   **[2]**

      4.1   Form factor
      4.2   Parts
      4.3   Chipset and controller
      4.4   Buses
      4.5   BIOS

Unit 5.   **Input Devices:**   **[1]**

      5.1   Keyboard
      5.2   Mouse
      5.3   Light pen
      5.4   and other input devices

Unit 6.   **Processor:**   **[5]**

      6.1   Arithmetic Logic Unit (ALU)
      6.2   Control Unit, Register
      6.3   Machine Cycle (Instruction cycle and Execution cycle)
      6.4   Buses (Data bus, Address Bus, Control Bus)

Unit 7.   **Storage Devices**   **[12]**

      7.1   Primary Storage Devices:
- RAM (Types, Speed, Access and Time, Size, Error Detection and Correction, Logical Memory Layout)
- ROM (PROM, EPROM, EEPROM)
- Cache Memory
- Flash Memory

      7.2   Secondary Storage Devices:
- Hard disk (Brief History, Construction and Operation, Speed, Disk Geometry, Track, Cylinder and sectors, Capacity, Partitioning and Formatting, Interface IDE/ATA/SATA/SCSI)
- Compact Disk (CD/DVD, Color book Specification, Performance and Reliability, CD/R-W principle, interface)

Unit 8.   **Video Display:**   **[2]**

      8.1   Video modes
      8.2   resolution
      8.3   color
      8.4   size

Unit 9.   Monitors: **[4]**

      9.1   CRT (Simple working Principle)

      9.2   LCD

Unit 10.   Printers: **[1]**

      10.1   Impact, non-impact

      10.2   Static or Laser

      10.3   Non-static or inkjet and bubble jet

Unit 11.   UPS.   **[2]**

      11.1   Introduction to UPS

Unit 12.   System Care   **[8]**

      12.1   **Preventive Maintenance:**
- General system care factors
- Cooling and Ventilation
- Power protection
- Data loss and virus protection)

      12.2   **Data problem detection:**
- Virus detection and protection
- Background of viruses
- Virus scanning and antivirus software

      12.3   **Backup and Disaster Recovery:**
- Risk of data
- Backup methods devices and media
- Backup scheduling
- Recovery of data

Laboratory Work   **[60]**

Unit 1.   Identification and Selection of Required Tools

      1.1   **Physical Assembly procedure:**
- Safety procedure, System case selection and preparation, layout of mother board, Secondary storage devices fitting and connections, Memory insertion, Power Connection, Processor and heat sink fitting, Connection of indicators and switches, Setting of jumpers, Insertion of peripheral cards like audio, NIC, Modem, Video Cards etc if necessary.

      1.2   **Installation of Operating Systems:**
- Management of Hard Disk (Partition and formatting), BIOS setup and installation of Operating system (Windows, Linux, Redhatetc), Installation of Device drivers, Configuration, Installation of Application Programs and antivirus.

1.3   Connecting Multiple Computers Together:

- Construction of UTP cable (Straight through and Cross-cable, Connecting through HUB, Switch or Direct connection, Assigning IP numbers and testing of networking.

1.4   Troubleshooting and Repairing Techniques:

- System Case, LEDs or Case Buttons, Key Lock, Power Sources and Power Protection Devices Cooling fans, air circulation, Motherboard and System Devices, General Failures, CMOS Memory or Real-Time Clock, System BIOS, Resources and Expansion Cards, Processor, System Memory, Memory Not Recognized, Out of Memory Problems, Performance Issues, Video Cards, Failure or Improper Operation, Image Quality Problems, Performance or Video Mode Issues, Monitors, Failure or Improper Operation, Hard Disk Drives, Booting or Operation Problems, Configuration Issues, Disk Compression Issues, Drive Letter Issues, File System Problems, Operating System, CD/DVD-ROM Drives, Drive Not Recognized, Configuration Problems, Audio Issues, Peripheral I/O Ports, Keyboards, Mice, Modems, Network Card, Operation and Connection Problems, Speed Issues, Applications Program Failure, Virus Detection and Protection (Background of viruses, Virus scanning and Antivirus software), Disaster Recovery (Risk of data, Backup methods devices and media, Backup scheduling, Recovery of data)

References:
1. Win Rosch, The hardware Bible 3rd Edition
2. Peter Norton, Introduction to Computers 4th Edition
3. Mark Minasi, The Complete PC Upgrade and Maintenance Guide
4. Scott Mueller, Upgrading and Repairing PCs

Geographical Information System (GIS)
EG 3114 CT
(Elective I)

Year : III	**Total: 7 hours / week**
Semester : I	**Lecture: 3 hours / week**
	Tutorial: 1 hour / week
	Lab: 3 hours / week

Course Description:

This course is designed to provide students in both the theoretical and practical aspects of geographic information system (GIS) to solve real-world problems. It deals with the basic concepts, data capture techniques, creating, processing, analyzing and visualizing geographic databases**.**

Course Objectives:

After completing this course the student will able to
- understand concept of GIS, evolution, benefits and its various application areas
- understand data structures, formats and explain data capturing methods, data creation, digitization, geo-referencing and data creation
- understand concept of map projection and co-ordinate systems
- analyze spatial and non-spatial data, data modeling and interpolation, TIN and DEM data and visualize map output
- understand concept of data input methods in GIS like GPS and Remote Sensing
- explore various open GIS programs and to understand their applications

Course Contents:

Unit 1. Introduction to Geographical Information System (GIS)   [3]
      1.1   Definition, History and Concepts of GIS
      1.2   Purpose and Benefits of GIS
      1.3   Functional Components of GIS
      1.4   Applications of GIS

Unit 2. GIS Data System   [14]
      2.1   Spatial and Attribute Data
      2.2   Data Structure and Formats
      2.3   Vector and Raster Data Models
      2.4   Methods of Data Capture in GIS
      2.5   Spatial Data Conversion
      2.6   Scanning, Digitization Methods
      2.7   Geo-referencing, Data Creation and Editing
      2.8   Map Scale and Resolution

Unit 3. Coordinate Systems and Map Projections   [6]
      3.1   Ellipsoid and Concept of Datum
      3.2   Geographic and Projected Coordinate Systems
      3.3   Projection Systems

Unit 4. Spatial Analysis and Visualization [12]
- 4.1 Handling and Querying Spatial Database
- 4.2 Vector Overlay Operations and Geo-processing
- 4.3 Buffering
- 4.4 Raster Overlay and Spatial Interpolation Methods
- 4.5 Triangular Irregular Networks (TIN) and Digital Elevation Model (DEM)
- 4.6 Map Output and Basic Elements

Unit 5. Introduction of Global Positioning System (GPS) and Remote Sensing
[4]
- 5.1 Basic Principle of GPS
- 5.2 GPS Segments
- 5.3 Handling GPS Receiver and Applications
- 5.4 Concept of Remote Sensing
- 5.5 Application of Remote Sensing

Unit 6. Open GIS [6]
- 6.1 Introduction of Open Concept in GIS
- 6.2 Open Source Software for GIS Analysis
- 6.3 Overview of Open Street map
- 6.4 Web Based GIS System

Practical: [45]

As a part of the laboratory exercise, the students should implement the concepts given in the chapters mentioned above.

Lab#1: Introduction to Arc GIS: Desktop GIS products (Arc View, Arc Editor, Arc Info, Arc Reader, Extensions), launching Arc Catalog, starting Arc Map, adding data, working with table of contents, navigating map, identifying features, changing map symbols, managing and saving data

Lab#2: Working with projections: recognizing the coordinate systems, defining projection and projection parameters, projecting shape files, geo-referencing images, transformation

Lab#3: Making maps: symbolizing point, line and polygon, labeling features, designing map layouts, exporting maps

Lab#4: Modifying attribute: working with tables, calculating values in table, calculating area, perimeter and length, creating XY coordinates, joining tables, creating map using excel location data

Lab#5: Querying and measuring: querying by attribute and location, measuring distance, buffer, multiple buffer

Lab#6: Geo-processing analysis: merge, dissolve, clip, intersect, union, model builder

Lab#7: Digitizing and creating geographical data: creating new shape files, mouse digitizing, editing shape files,

Lab#8: Spatial and 3D analysis: creating TIN and DEM, interpolation, contour, slope

Lab#9: Raster calculator, reclassify, convert vector to raster, raster to vector, raster to ASCII

Lab#10: Handling Global Positioning System (GPS) receiver, tracking and locating waypoints, add GPS data to Arc Map and Google Earth for analyzing and visualization

References books:
1. Chang, K-T. (2012). Introduction to Geographic Information Systems, 6th Edition, McGraw Hill.
2. Otto, H and Rolf, A. (2009). Principle of geographic information system: An Introductory Textbook, International Institute of Geo-information Science and Earth Observation, The Netherlands.
3. Longley, P.A., Goodchild, M., Maguire, D.J., Rhind, D.W. (2015). Geographical information systems and science. 4th ed. John Wiley & Sons.
4. Neteler, M. (2008). Open source GIS: a GRASS GIS approach. Springer Science+Business Media, New York.
5. Anji Reddy M. (2006). Remote sensing & GIS. BS Publications.
6. Burroughs, P. A. (1986). Principles of Geographic Information Systems for land Resources Assessment. Clarendon Press, Oxford.

Cloud Computing
EG 3114 CT
(Elective I)

Total: 7 hour /week

Year: III   **Lecture: 3 hours/week**
Semester: I   **Tutorial: 1 hours/week**
                                                              Lab: 3 hours/week

Course Description:

This course aims to guide the students in both the theoretical and practical aspects of developing Cloud solution for real-world problems. One will study the tools and techniques used in analysis and design of cloud computing, and apply those tools within a recognized cloud development methodology.

Course Objectives:
  The main objective of this course is to provide cloud computing, cloud security, Cloud computing platforms and Cloud for the enterprise as service.

Course Contents:

Unit 1: Introduction to Cloud Computing   [8]
1.1 Evolution of Cloud computing
1.2 Introduction to Virtualization and Virtual Machine
1.3 Virtual Network
1.4 Information Model and Data model for Virtual Machine
1.5 Service-Oriented architecture
1.6 Cloud architecture and cloud storage
1.7 Characteristics of cloud computing
1.8 Limitations and benefits of cloud computing

Unit 2: Cloud computing architecture   [10]
2.1 Public cloud
2.2 Private cloud
2.3 Hybrid Cloud
2.4 Utility computing and elastic computing
2.5 Hardware and infrastructure
2.6 Network and security
2.7 clients and services
2.8 Platforms
2.9 web applications and web APIs
2.10 Cloud storage providers

Unit 3: Web services and Platforms   [8]
3.1 Software as service
3.2 Platform as service
3.3 Infrastructure as service
3.4 Process as service
3.5 Application as service
3.5 Storage as a service

3.6 Information as service
3.7 Integration as a service
3.8 Security as service

Unit 4: data in Cloud [5]
4.1 Relational Databases
4.2 Cloud file systems
4.3 Features and comparisons
4.4 Big Table, H Base and Dynamo
4.5 Cloud data stores

Unit 5: Cloud computing platforms [8]
5.1 Installing cloud platforms and performance evaluation
5.2 Features and functions of cloud platforms:
5.3 Xen Cloud Platforms
5.4 Eucalyptus,
5.5 Open Nebula,
5.6 Nimbus, TPlatform,
5.7 Apache Virtual Computing Lab (VCL)

Unit 6: Cloud for the enterprise as service [6]
 6.1 Storage
 6.2 Database
 6.3 Information
 6.4 Process
 6.5 Platform
 6.6 Integration
 6.7 Security
 6.8 Management/ Governance
 6.9 Infrastructure

Practical: [45]

Lab exercises are as follows:
   a) Apply Map- Reduce programming
   b) Service deployment & Usage over cloud.
   c) Managing Cloud Computing Resources
   d) Using existing cloud characteristics & Service models
   e) Performance evaluation of services over cloud
   f) Apply Google App Engine, Microsoft Azure
   g) Hadoop, Amazon, Aneka

References:
   1. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F. Halper (Wiley India Edition)
   2. Enterprise Cloud Computing by Gautam Shroff, Cambridge
   3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
   4. Cloud Computing and SOA Convergence in your Enterprise, David S. Linthicum, Pearson

Management Information System
EG 3114 CT
(Elective I)

	Total: 7 hour /week
Year: **II**	**Lecture: 3 hours/week**
Semester: II	**Tutorial: 1 hours/week**
	Lab: 3hours/week

Course Description:

The primary objective of the Management Information Systems Department is to prepare students for exciting and challenging careers in the information systems arena. The MIS major prepares students for such entry level positions as systems analysts, programmer-analysts, and database analysts by providing them with a thorough grounding in the principles of information system design and construction. The MIS curriculum includes coverage of computer programming, database design and implementation, networks and data communications, systems analysis, systems implementation, managerial decision-making, and managerial aspects of organizational information systems.

Course Objectives:

After completing this course the students will be able to:
1. understand information systems
2. plan information systems
3. manage information systems
4. discuss on specific modern trends like BPR, ERP and E-Business.

Course Contents:

Unit 1.   **Foundation Concepts in Information System:**   **[5]**
        1.1   Define of IS
        1.2   IS Framework for business users
        1.3   Role of Information system
        1.4   Types of IS and its components
        1.5   IS Vs IT
        1.6   Emerging trends and challenges of IT
        1.7   IS resources:
- Hardware resources
- Software resources
- Network resources
- Data resources

        1.8   Case study

Unit 2.   **Data and Resource Management:**   **[4]**
        2.1   Define of DRM
        2.2   Foundation data concepts
        2.3   Product specifications
        2.4   DBMS concepts
        2.5   Types of DBMS and databases
        2.6   Designing databases
        2.7   Databases objects

- Benefits and challenges of SCM
- Trends in SCM
5.6 Case Study

Unit 6. **Intelligent Information System:** [6]
6.1 Introduction
6.2 Business analysis
6.3 Business intelligence
6.4 Business intelligence architecture
6.5 Data Mining
6.6 Methods and framework
6.7 OLAP and multidimensional databases
6.8 Clustering
6.9 Decision trees
6.10 Artificial intelligence and neural network
6.11 Decision support in business
6.12 Trends of decision support
6.13 Knowledge management system
6.14 Case Study

Unit 7. **Developing Business/IT Strategies:** [4]
7.1 Planning fundamentals
7.2 Business/IT planning
7.3 The ROI process in business/IT planning
7.4 An enterprise-wide architecture
7.5 Information engineering
7.6 Change management
7.7 System development life cycles
7.8 Prototyping and advanced development
7.9 Data flow diagram
7.10 E-R diagram
7.11 Case Study

Unit 8. **Information Security and Ethical Challenges:** [6]
8.1 Introduction
8.2 Information security threats
8.3 Information security policy
8.4 Inter networked security defense
8.5 Other security measures
8.6 System control and audits
8.7 Ethical responsibilities of business professionals
- Business ethics
- Technological ethics
- Ethical guidelines
8.8 Computer crime
8.9 Hacking
8.10 Software piracy
8.11 Intellectual property right (IPR)
8.12 Computer viruses and worms
8.13 Privacy issues
8.14 Health issues (Ergonomics)
8.15 Employee challenges
8.16 Challenges in working conditions

Unit 9. **Enterprise and Global Management of IT:** **[4]**
       9.1   Business and IT
       9.2   The impact of IT on managers, Enterprise
       9.3   Managing IT
       9.4   Managing IS function
       9.5   Failures of IT management
       9.6   Global IT Management
       9.7   Global business IT strategies
       9.8   Global business IT applications
       9.9   Global IT platform
       9.7   Case Study

(Above, preceding Unit 9:)
       8.17   Other challenges
       8.17   Case Study

Practical/Case study: **[45]**

1. Case study of Foundation concepts in information system
2. Case study of Data and resource management
3. Case study of Telecommunication and network of business
4. Case study of Introduction to e-business system
5. Case study of Enterprise information system
6. Case study of Intelligent information system
7. Case study of Developing business/IT strategies
8. Case study of Information security and ethical challenges
9. Case study of Enterprise and global management of IT

* Manage fully developed Management Information System organization study visit.

Reference Textbooks and Readings:

1. James A O'Brien, George Ma Markas (9th Edition). Management Information System: Ramesh Behl, India
2. Kenneth C. Laudon, Jane P. Laudon (14th Edition). Management Information System: Managing the Digital Firm,
3. Marianne M. Jennings (10th Edition). Business: Its Legal, Ethical, and Global Environment; © 2015, 2012 Cengage Learnings
4. Efraim Turban, Linda Volonino, Gregory R. Wood (10th Edition). Information Technology for Management: Digital Strategies for Insight, Action, and Sustainable Performance; Wiley.
5. Kenneth C. Laudon, Jane Laudon (10th Edition), (January 18, 2012). Essentials of Management Information Systems; Prentice Hall

Data Mining
EG 3114 CT
(Elective I)

Year : III	**Total: 7 hours/ week**
Semester : I	*Lecture: 3 hours / week*
	Tutorial: 1 hour / week
	Lab: 3 hours week

Course Description:

This course is an introduction to Data mining. It covers topics to understand the fundamental aspects of data warehousing and data mining.

Course Objective:

After completing this course the student will able to:
1. Explain the basic aspects of data mining and decision support fundamentals and techniques.
2. Explain the data collection, cleaning, and aggregation issues.
3. Utilize a data mining query language
4. Utilize statistical techniques for analyzing data

Course Contents:

1. **Unit 1An Overview of Database Systems:** [6]
   1.1 Review of traditional processing & its limitations
- Evolution of Database systems
- Database Applications & users
- Main characteristics of the Database approach

   1.2 Database Languages
- Structured Query Language (SQL)
- Functional Dependencies
- Data Manipulation Language

Unit 2Data warehousing [10]
   2.1Data warehouse design
- Definition
- star schemas
- fact tables
- dimensions
- dimension hierarchies
- Data mart

   2.2 OLAP and Data mining
- Definition

   2.3 Data warehouse physical design
- Partitioning
- Parallelism
- Compression
- Indexes

Any two

Unit 3Data warehouse construction [8]
   3.1 Introduction

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a. Data extraction
        i.   Data transformation
            3.2.2   Loading and refreshing.
    . Data warehouse support by Oracle
        3.3 OLAP architectures
                3.3.1   SQL extensions for OLAP

Unit 4Data mining Models   **[12]**
4.1 Statistical Method
    4.1.1 Probability (averaging, mean square deviation)
     4.1.2 Maximum likely hood methods
    4.1.3 Baysaien methods
    4.1.4 Cross validation
4.2 Decision tree
    4.2.1 Information gain
    4.2.2 Decision tree learning
    4.2.3 Classification
4.3 Neural network
    4.3.1 Supervised neural networks
    4.3.2 Perception
    4.3.3 Back propagation
4.4 Cluster analysis
    4.4.1 k means
     4.4.2 Hierarchical clustering

Unit 5Data mining Applications   **[9]**
5.1 Techniques for mining large databases
5.1.1   text mining
5.1.2   web mining
5.1.3   visual data mining
5.2 Data mining support in SQL Server
5.3 Data mining in Oracle
5.4 Data mining standards
5.4.1 Privacy and security issues.

Practical: **[45]**
    1. Selection of interesting data sets
    2. Representation of data and information
    3. Feature extraction, feature construction, feature selection
    4. Data cleaning
    5. Descriptive data mining,
    6. finding patterns, clustering
    7. Predictive data mining: Finding a prediction task
    8. Prediction performances
 Tools: Appropriate tools can be used. For example: wiki tools

Reference Books
1. Han, J. & Kamber. M, Data Mining Concepts and Techniques, Morgan Kaufmann
2. Bramer,M. Principles of Data Mining. Springer.
3. Bing, L. Web Data Mining. Springer
4. Dunham, M.H. Data Mining: Introductory and Advanced Topics, Prentice Hall, 2003.

Minor Project

EG 3115 CT

Year: III

Semester: I

Total: 3 hour /week
Lecture: hours/week
Tutorial: hours/week
Practical: 3 hours/week

Course description:

This course provides students with an idea of how to transform the theoretical knowledge gained in earlier semester into practical applications. The students will build a real life project during this course using the knowledge gained in earlier semesters

Course Objectives:
After completing this course the students will be able to:
1. learn and gain the knowledge about the programming tool they used to implement the real life project
2. plan, design, develop and implement the real life problem as a project
3. formulate project documentation and oral presentation for his/her final year project

Course Contents:

Minor Project:
- Explain the minor project concept note in a class by project teachers
- Preliminary selection of topic
- Discussion with department regarding the practically of the project (e.g. cost, usefulness, market)
- Finalization of topic
- Submission of the detail proposal (Extensive literature review including survey)
- After approval by project teachers, start of minor project work in laboratory /home
- Monitoring of the work progress by project teachers and report to department
- A mid-term progress report should be submitted by the student on the date fixed by department
- Presentation of mid-term progress of the minor project along with report (this presentation will be used as an internal assessment by department and will consist of 40% evaluation)
- Final presentation of minor project should be conducted by the department and should be evaluated by the project teachers in the presence of other teachers in the related field, not involved in minor projects, but from the same department. This will consist of 60% evaluation

The Minor Project shall include the following teachers and members
- Project team members (minimum 2 and maximum 4 person per group)
- Project Teachers (minimum 2 to maximum 4 teachers)

The Minor Project Report shall include the following details in an organized manner
- Technical Descriptions of the minor project
- Project task and time schedule
- System aspect of the project

- Baseline performance of the project
- Performance analysis methodology
- Reusability of modules in the software
- Implementation Area

Evaluation Scheme

- The final presentation should be evaluated by project teachers as well as other teachers in the related file on the basis of::
  i) Quality of presentation (10%)
  ii) Understanding of project work and related theory (25%)
  iii) Expected result of the project (20%)
  iv) Usefulness of the project (5%)

Students must submit a group report in the format prescribed by their project teachers.

Third Year (Second Semester)

Sixth Semester

Subjects:

EG 3208 CT   Multimedia Technology

EG 3209CT   Network and System Administration

EG 3201 MG   Entrepreneurship Development

EG 3202 SH   Technical English

EG 3210CT   Elective – II

            a. Big Data
            b. E-commerce
            c. Mobile Application Development
            d. Telecommunication

EG 3211 CT   Cyber Security and Social Ethics

EG 3212CT   Major Project

Multimedia Technology

EG 3208 CT

Total: 7 hour /week

Year: **III**   **Lecture: 3 hours/week**

Semester: II   **Tutorial: 1 hours/week**

Lab: 3 hours/week

Course Description:

The main objective of this course is to give the fundamental knowledge of multimedia technologies and cover three main domains of Multimedia Systems: Devices, Systems and applications

Course Objectives:

After completing this course the students will be able to:
1. understand basics of audiovisual properties
2. understand communication, synchronization of audio video system

Course Contents:

Unit 1.   **Introduction:**   **[4]**
                1.1 Multimedia,
                1.2 Uses of multimedia,
                1.3 Components of multimedia,
                1.4 Multimedia building blocks,
                1.5 Multimedia and Personalized Computing,
                1.6 Medium,
                1.7 Multimedia system and properties,
                1.8 Data Streams Characteristics,
                1.9 Data Stream Characteristics for Continuous Media, Information Units

Unit 2.   **Sound / Audio System:**   **[3]**
                2.1 Concepts of sound system,
                2.2 Music and speech,
                  2.3 Speech Generation,
                  2.4 Speech Analysis,
                2.5 Speech Transmission

Unit 3.   **Images and Graphics:**   **[4]**
                3.1 Digital Image Representation,
                3.2 Image and graphics Format,
                3.3 Image Synthesis,
                3.4 Analysis and Transmission

Unit 4.   **Video and Animation:**   **[4]**
                4.1 Video signal representation,
                4.2 Computer- Based animation,
                4.3 Animation Language,
                4.4 Methods of controlling Animation,

4.5 Display of Animation,
4.6 Transmission of Animation

Unit 5.   Data Compression: [4]
5.1 Need for data compression
5.2 Compression basics
5.3 Lossless compression
5.4 Lossy compression
5.5 LZW Compression

Unit 6.   Designing Multimedia :   [4]
6.1 Development phases and development team,
6.2 analysis phase,
6.3 Design phase,
6.4 development phase,
6.5 Implementation phase,
6.6 Evaluation and testing phase.

Unit 7.   Communication Systems in Multimedia: [4]
7.1 Application Subsystem,
7.2 Transport subsystem,
7.3 Quality of service and resource management,
7.4 Trends in collaborative Computing,
7.5 Trends in Transport Systems,
7.6 Multimedia Database Management System

Unit 8.   Documents, Hypertext and MHEG (Multimedia and Hypermedia Information Coding Expert Group):   [4]
8.1 Documents, Hypertext and Hypermedia,
8.2 Document Architecture SGML(standard generalized markup language),
8.3 Document Architecture ODA,
8.4 MHEG

Unit 9.   User Interfaces: [3]
9.1 Basic Design Issues,
9.2 Video and Audio at the User Interface,
9.3 User- friendliness as the Primary Goal

Unit 10.   Synchronization: [4]
10.1 Notation of Synchronization,
10.2 Presentation Requirements,
10.3 Model for Multimedia Synchronization,
10.4 Specification of Synchronization

Unit 11.   Abstractions for programming: [4]
11.1 Abstractions Levels,
11.2 Libraries,
11.3 System Software,
11.4 Toolkits,
11.5 Higher Programming Languages,
11.6 Object –oriented approaches
Unit 12.   Multimedia application: [3]

12.1 Program and Structure,
12.2 Media Preparation,
12.3 Media Composition,
12.4 Media Integration,
12.5 Media Communication,
12.6 Media Consumption,
12.7 Media Entertainment,
12. 8 Trends in multimedia applications

Practical: **[45]**

Lab exercises are as follows:
1. to edit various format of Images and give the various effects in images using Adobe Photoshop
2. vector-based drawing application using Macromedia FreeHand
3. to create different types of animation, use the action script to control the various objects using Macromedia Flash and swish Max
4. to edit and publish the movie in various formats using Adobe Premiere
5. to integrate all the multimedia objects like audio, video , images etc and will able to create different interactive presentations using Macromedia Director

References books:
1. Multimedia: Computing, Communications and Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education Asia
2. Multimedia Communications, Applications, Networks, Protocols and Standards, Fred Halsall, Pearson Education Asia
3. Multimedia Systems, John F. Koegel Buford, Pearson Education Asia
4. Multimedia Technologies , Ashok Banerji, Ananda Mohan Ghosh, Tata MCGraw Hill

Network and System Administration
EG 3209 CT

Total: 6 hour /week

Year: **III**   **Lecture: 3 hours/week**

Semester: II   **Tutorial: hours/week**

Lab: 3 hours/week

Course Description

This course deals with fundamentals of computer networks, its architecture, its standards and protocols used in computer network.

Course objectives:

After completing this course the students will be able to:

1. Understand the architecture of computer network
2. Know various hardware devices and software used in computer networks
3. Setup small home/office network

Course Contents:

Unit 1.   **Review of Computer Networking**   **(4)**

      1.1 Networking Fundamentals

      1.2 Reviews of OSI Reference Model

      1.3 Review of TCP/IP Model

      1.4 Network protocols

      1.5 Window and Linux Server

Unit 2.   **Server Administration**   **[8]**

      1.1 Installing Linux in a Server Configuration

      1.2 Basic Command in Linux Operating System

      1.3 Managing Users and Groups

      1.4 The Command Line

      1.5 Booting and Shutting Down

      1.6 File Systems

      1.7 Core System Services

      1.8 The Linux Kernel

      1.9 Virtual File Systems

      1.10   Package Management

Unit 3.   **Services Management**   **[8]**

      3.1 Managing Services

      3.2 Mail Servers

      3.3 FTP

      3.4 Web Servers

      3.5 News Service

      3.6 Database Services

Unit 4.   Shared Resources: **[6]**
    4.1 Print Services
    4.2 Network File Systems, Network Information System, and Distributed Network File
          Systems: NFS, NIS, and GFS
    4.3 Samba
    4.4 Cloud Computing

Unit 5.   Network Support: **[8]**
    5.1 Proxy Servers: Squid
    5.2 Domain Name System
    5.3 Network Auto-configuration with IPv6, DHCPv6, and DHCP
    5.4 Firewalls
    5.5 Administering TCP/IP Networks

Unit 6.   Shells: **[4]**
    6.1 Shells
    6.2 Working with files and directories
    6.3 Shell Variables and Scripts
    6.4 Shell Configuration

Unit 7.   Network Infrastructure: **[4]**
    7.1 Concept of Switch
    7.2 Static Routing and Dynamic Routing
    7.3 VLAN Configuration
    7.4 Spanning Tree

Unit 8.   Active Directory and Network Configuration: **[6]**
    8.1 Installation of Window Server
    8.2 Configure the Activate Directory
    8.3 Concept of DHCP in window server
    8.4 Concept of DNS in Window Server

Practical: **[45]**

Following lab exercises must be performed on Linux based server platform or window based
server platform.

1. Install the Server/Client Installation over VMware Environment such as Window Server
   2012 or Linux Server
2. Perform the system administration activities: User/Group management, File System
   Management.
3. Demonstrate the Packet analysis by using Packet Tracer
4. Configure the Firewall on network system.
5. Demonstration on DHCP configuration and troubleshooting using Linux or Window
   server.
6. Demonstration on DNS Configuration and Troubleshooting

7. Demonstration about Web and Proxy Server Configuration and Troubleshooting
8. Configure and troubleshoot on SAMBA, NFS and FTP Troubleshooting.
9. Working on Webmin/SSH

Recommended books:

1. Larisa and Aleina (2015).Ubuntu 15.04 Server with systemd: Administration and Reference,
2. Jonathan Hobson (2013). CentOS 6 Linux Server Cookbook. Packt Publishing
3. Stanek, William R. (2012). Windows Server 2012 Inside Out, Delhi, Phi Learning Private Limited.
4. Mitch Tulloch, (2012). Introducing Windows Server 2012. Microsoft Press
5. Orin Thomas (2013). Configuring Advanced Windows Server 2012 Services. O'Reilly Media

Entrepreneurship Development
EG 3201 MG

Year: III
Semester: II

Total: 5 hour /week
Lecture: 3 hours/week
Tutorial: hours/week
Practical: 2 hours/week

Course description:

This course is designed to provide the knowledge and skills on formulating business plan and managing small business. The entire course deals with assessing, acquiring, and developing entrepreneurial attitude; skills and tools that are necessary to start and run a small enterprise.

Course objectives:

After completion of this course students will be able to:

1. Understand the concept of business and entrepreneurship
2. Explore entrepreneurial competencies
3. Analyze business ideas and viability
4. Learn to formulate business plan with its integral components
5. Manage small business

Course content:

THEORY

Unit 1: Introduction to business & entrepreneurship   [9]

      1.1   Overview of entrepreneur and entrepreneurship

      1.2   Wage employment, self- employment and business

      1.3   Synopsis of types and forms of enterprises

      1.4   Attitudes, characteristics & skills required to be an entrepreneur

      1.5   Myths about entrepreneurs

      1.6   Overview of SME in Nepal

Unit 2: Exploring and developing entrepreneurial competencies   [10]

      1.1   Assessing individual entrepreneurial inclination

      1.2   Assessment of decision making attitudes

      1.3   Risk taking behavior and risk minimization

      1.4   Creativity and innovation in business

      1.5   Enterprise management competencies

Unit 3: Business identification and selection **[4]**

    1.1   Sources and method of finding business idea(s)

    1.2   Selection of viable business ideas

    1.3   Legal provisions for SMEs in Nepal

Unit 4: Business plan formulation **[17]**

    1.1   Needs and importance of business plan

    1.2   Marketing plan

- Description of product or service
- Targeted market and customers
- Location of business establishment
- Estimation of market demand
- Competitors analysis
- Estimation of market share
- Measures for business promotion

    1.3   Business operation plan

- Process of product or service creation
- Required fix assets
- Level of capacity utilization
- Depreciation & amortization
- Estimation office overhead and utilities

    1.4   Organizational and human resource plan

- Legal status of business
- Management structure
- Required human resource and cost
- Roles and responsibility of staff

    1.5   Financial plan

- Working capital estimation
- Pre-operating expenses
- Source of investment and financial costs
- Per unit cost of service or product
- Unit price and profit/loss estimation of first year

    1.6   Business plan appraisal

- Return on investment
- Breakeven analysis
- Risk factors

Unit 5: Small business management **[5]**

    5.1   Concept of small business management

    5.2   Market and marketing mix

    5.3   Basic account keeping

Practical:

Unit 1: Overview of business & entrepreneurship [2]

    1. Collect business information through interaction with successful entrepreneur

Unit 2: Exploring and developing entrepreneurial competencies [2]

    1. Generate innovative business ideas

Unit 3: Product or service identification and selection [2]

    1. Analyze business ideas using SWOT method

Unit 4: Business plan formulation [22]

    1. Prepare marketing plan

    2. Prepare operation plan

    3. Prepare organizational and human resource plan

    4. Prepare financial plan

    5. Appraise business plan

    6. Prepare action plan for business startup

Unit 5: Small business management [2]

    1. Prepare receipt and payment account

    2. Perform costing and pricing of product and service

Text books:

क) प्रशिक्षकहरुकालागिनिर्मित निर्देशिकातथा प्रशिक्षण सामग्री, प्राविधिकशिक्षातथाव्यावसायिकतालीम परिषद्, २०६९

ख) प्रशिक्षार्थीहरुकालागिनिर्मित पाठ्यसामग्रीतथाकार्यपुस्तिका, प्राविधिकशिक्षातथाव्यावसायिकतालीम परिषद् (अप्रकाशित), २०६९

References:

1. Entrepreneur's Handbook, Technonet Asia, 1981.
2. Khanna S.S., Entrepreneurship Development, S. Chand & Co. New Delhi
3. David H. Holt, Entrepreneurship: New Venture Creation, Prentice Hall India
4. Mohanty Sangram Keshari, Fundamentals of Entrepreneurship, Prentice Hall India

Technical English
EG 3202 SH

	Total: 3 hour /week
Year: III	**Lecture: 3 hours/week**
Semester: I	**Tutorial: hours/week**
	Practical: hours/week
	Lab: hours/week

Course Description:

This course is designed to meet the requirement of Diploma Level studies under CTVT programme.

Course Objectives:

After completing this course the students will be able to
1. understand read, write, listen English well
2. present technical writing in their own way
3. get acquaintance with some of the required words, Antonyms and synonyms

Course Contents:

Unit 1. Reading Passage: **[10]**
  1.1 Predicting Content
  1.2 Skim
  1.3 Summary
  1.4 Note making

Unit 2. Writing: **[15]**
  2.1 paragraph writing
  2.2 Letter writing
     • Letter to the editor
     • Leave letter
  2.3 Writing simple technical reports

Unit 3. Listening: **[8]**
  3.1 Synonyms and antonyms
  3.2 Word formation
  3.3 Fill in the blanks
  3.4 American English/British English

Unit 4. Focus on language: **[6]**
  4.1 Prepositions
  4.2 Phrasal verbs
  4.3 Note making
  4.4 Cause and effect
  4.5 purpose and function

Unit 5. Speaking: [6]
     5.1   Different speech functions
     5.2   Introducing a guest
     5.3   Vote of thanks

References books:

1. English for technical communication volume 1 & 2 combined edition by K.R Lakshminarayanan
2. SciTech publications (India) Pvt. Ltd Chennai & Hyderabad
3. Communication skills for engineers and professional by Prajapati Prasad 5th revised edition & published by Enlarged edition S.K. Kataria and Son's Delhi.

Big Data

EG 3210 CT
(Elective II)

Total: 7 hour /week

Year: III

Lecture: 3 hours/week

Semester: II

Tutorial: 1 hours/week

Practical: 3 hours/week

Course Description:
The main objective of this course is to cover the big data for business intelligence, to learn business case studies for big data analytics, to study NOSQL big data management and to perform map-reduce analytics using Hadoop and related tools

Course Objectives:
After completing this course the students will be able to:
- describe big data and use cases from selected business domains
- explain NoSQL big data management
- install, configure, and run Hadoop and HDFS
- perform map-reduce analytics using Hadoop
- use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

Course Contents:

UNIT 1: Introduction [6]
 1.1 Big data concepts and applications,
 1.2 cloud and big data,
 1.3 Distributed system in big data,
 1.4 current tread in big data.
 1.5 Examples of big data

UNIT 2: Mapreduce Application [9]
2.1 MapReduce workflows,
2.2 unit tests with MRUnit,
2.3 test data and local tests,
2.4 anatomy ofMapReduce job run,
2.5 fault tolerance,
2.6 optimization and data locality,
2.7 parallel efficiency of Map reduce.

UNIT 3: Nosql Data Management [10]
3.1 Introduction to NoSQL,
3.2 aggregate data models,
3.3 key-value and document data models,
3.4 relationships – graph databases,
3.5 schemaless databases,
3.6 materialized views,
3.7 distribution models,
3.8 sharding ,
3.9 master-slave replication,
3.10 peer-peer replication,
3.11 sharding and replication

3.13 relaxing consistency,
3.13 version stamps,
3.14 map-reduce ,
3.15 partitioning and combining,
3.16composing map-reduce calculations

UNIT 4: Fundamentals of HADOOP [10]
4.1 Data format,
4.2 analyzing data with Hadoop,
4.3 scaling out,
4.4 Hadoop streaming,
4.5 Hadoop pipes and design of Hadoop
4.6 distributed file system (HDFS) ,
4.7 HDFS concepts,
4.8 ava interface ,
4.9 Hadoop I/O,
4.10 data integrity,
4.11 compression,
4.12 serialization,
4.13 Avro,
4.14 file-based data structures

UNIT 5: HADOOP Tools [10]
5.1 Hbase,
5.2 data model and implementations,
5.3 Hbase examples,
5.4 cassandra data model with examples,
5.5 cassandra clients,
5.6 Hadoop integration,
5.7 pig data model,
5.8 developing and testing Pig Latin scripts.
5.9 Hive, data types and file formats,
5.11 HiveQL data definition,
5.12 HiveQL data manipulation,
5.13 HiveQLqueries.

PRACTICAL: [45]

Lab exercises are as follows:
- Perform map-reduce analytics using Hadoop
- Oracle *NoSQL* Database
- Install, configure, and run Hadoop and Hadoop Distributed File System (HDFS)
- Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

REFERENCES:
1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: EmergingBusiness Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
5.Jeffrey Dean, Sanjay Ghemawat, Map reduce, "simplified data processing on large clusters"

E-commerce

EG 3210 CT
(Elective II)

Year: **III**

Semester: **II**

Total: **7 hour /week**
Lecture: **3 hours/week**
Tutorial: **1 hours/week**
Lab: **3 hours/week**

Course Description:

This course aims to guide the students in both the theoretical and practical aspects of developing computer solutions for real-world problems. One will study the tools and techniques used in analysis and design of software systems, and apply those tools within a recognized software development methodology and within the context of a case study.

Course Objectives:
After completing this course the students will be able to
    1. Understand the community concept and develop the E-Commerce sites.

Course Contents:

Unit 1.   Fundamental concept of E-Commerce: **[6]**
      1.1   Definition of Electronic Commerce
      1.2   Scope of Electronic Commerce
      1.3   Electronic E-commerce and the Trade Cycle
      1.4   Emergence of Internet and commercial use of Internet
      1.5   E-commerce Models, Personal web server, Internet information server, ASP page Contain scripts, Contain objects and components, Database access,
      1.6   Application of E-Commerce

Unit 2.   Business-to-Business Electronic Commerce   **[6]**
      2.1   Characteristics of Business-to-Business Electronic Commerce
      2.2   Models of Business-to-Business Electronic Commerce
      2.3   Procurement Management Using the Buyer's Internal Marketplace
      2.4   Just in Time Delivery
      2.5   Integration with Back-end Information System
      2.6   Electronic marketing in Business-to-Business
      2.7   Electronic Data Interchange (EDI)
      2.8   EDI: The Nuts and Bolts, EDI & Business
      2.9   Auctions and Services from Traditional to Internet Based EDI

Unit 3.   E-marketing: **[5]**
      3.1   Define E-marketing
      3.2   Explain Traditional Marketing
      3.3   Define Online Marketing
      3.4   Advantages of Online Marketing
      3.5   E-advertisement
      3.6   Browsing behavior
      3.7   Model of an online video store

Unit 4.   **Mobile and Wireless Application**   **[5]**
   4.1   Define Mobile and wireless
   4.2   Growth of Mobile Commerce
   4.3   Wireless Application Protocol (WAP)
   4.4   Use of technologies for mobile commerce
   4.5   Architecture of Wireless Application Protocol
   4.6   Generations in Wireless Communications
   4.7   Security Issues related to Wireless Communication

Unit 5.   **Network Infrastructure for E-commerce:**   **[8]**
   5.1   Network and internets
   5.2   Network routers
   5.3   Internet protocol suites
   5.4   Internet naming convention, (URLs, TCP, FTP, ISP, Telnet, Search engine)
   5.6   Broadband technologies
   5.7   Web-based client/server
   5.8   Internet Security
   5.9   Selling on the web
   5.10   Chatting on the web
   5.11   Multimedia delivery
   5.12   Analyzing web visits
   5.13   Managerial issues

Unit 6.   **Electronic payment system:**   **[4]**
   6.1   Define Electronic payment system
   6.2   Types of electronic payment system
   6.3   Digital token based E-payment system
   6.4   Smart Cards & E-payment systems
   6.5   Credit card based payment systems
   6.6   Risk factor in electronic payment system

Unit 7.   **Consumer oriented E-commerce:**   **[6]**
   7.1   Define consumer
   7.2   Consumer oriented applications
   7.3   Mercantile process and models
   7.4   Mercantile models from the viewpoint of producer and consumer perspective
   7.4   Consumer relationship management and solution
   7.5   Converting clicks to customers
   7.6   Customer retention goal

Unit 8.   **Public Policy:**   **[5]**
   8.1   From legal issues to privacy
   8.2   E-commerce related legal incidents
   8.3   Ethical and other public policy issues
   8.4   Protecting privacy
   8.5   Protecting intellectual property
   8.6   Internet indecency and censorship
   8.7   Taxation and encryption policies
   8.8   E-commerce Law
   8.9   Forms of Agreement
   8.10   Government policies

Practical/Case study: [45]

1. Foundation concepts of E-commerce
2. Business-to business electronic commerce
3. E-marketing
4. Mobile and wireless application
5. Network Infrastructure for E-commerce
6. Electronic payment system
7. Consumer oriented E-commerce
8. Public policy

* Manage fully developed E-commerce management organization study visit.

References books:

1. Noel Jerke, April 2012. E-Commerce Developer's Guide to Building Community and using Promotional Tools. Sybex Inc.
2. Kenneth C. Laudon and Carol Guercio Traver, (11th edition), 2015. E-commerce 2015 business, technology, society. Pearson
3. Adrise Reinders and Marion Freijsen. The E-Factor: Entrepreneurship in the Social Media Age. BenBella Books, Inc. 2012
4. Janice Reynolds, (2nd edition), 2015. The Complete E-Commerce Book, Design, Build & Maintain a Successful Web-based Business. Focal Press
5. Amir Manzoor, (1st edition), 2015. E-commerce 2016. Printed in the United States of America.

Mobile Application Development
EG 3210 CT
(Elective II)

	Total: 7 hour /week
Year: III	**Lecture: 3 hours/week**
Semester: II	**Tutorial: 1 hours/week**
	Lab: 3 hours/week

Course Description:

This course is designed to develop the mobile application for the Android platform. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android application with Create Application, design user Interface, Intents, Broadcast Receivers, Adapters, Data Storage, Retrieval, Sharing, Maps, Geocoding, and Location-Based Services, Peer-to-Peer Communication, Hardware Interfacing and finally publish it on Google Play.

Course Objectives:

After the completion of this course, the students should be able to: -
* gain a good understanding of the basic concepts of mobile technology and mobiles operating system.
* develop android based mobile apps using Android SDK tool kits.
* use various Layouts and Widgets in Android Applications.
* create interactive applications in android with multiple activities including audio, video and notifications.
* deploy applications to the Android marketplace for distribution.

Course Contents:

Unit 9.   Technological Revolution and Mobile Technology :   [3]
      1.1   Changing the Shape of Digital Gadgets
      1.2   Tele communication revolution
      1.3   Mobile VAS Services
      1.4   E-enabled services in Mobile
      1.5   Mobile Wallets
      1.6   Screen resolution and Touch interfaces revolution
      1.7   App Store, Google Play, Windows Store
      1.8   Development environments
      1.9   Mobile OS Architecture
      1.10 Android Development Tools
      1.11 Environments Set up

Unit 10.   Create Application and user Interface: [6]

2.1 Creating Applications and Activities

2.2 Introducing the Apps Manifest

2.3 The Android Apps Life Cycle

2.4 Runtime Configuration Changes

2.5 Fundamental Android UI Design and user interface

2.6 The Android Widget Toolbox

2.7 Introducing Layouts

2.8 Creating and modify Views

2.9 Creating Custom Widgets and Controls

2.10   Using Custom Controls

2.11   Creating and Using Menu

2.12   Submenus and Context Menus

Unit 11.   **Intents, Broadcast Receivers, Adapters, and the Internet:**   **(6)**

3.1 Introducing Intents

3.2 Using Intents to Launch Activities

3.3 Using Intent Filters for Plug-ins and Extensibility

3.4 Using Intents to Broadcast Events

3.5 Introducing Adapters

3.6 Using Adapters for Data Binding

3.7 Using Internet Resources

3.8 Connecting to an Internet Resource

3.9 Introducing Dialogs

3.10 Using Activities as Dialogs

Unit 12.   **Data Storage, Retrieval, and Sharing:**   **[8]**

4.1 Android Techniques for Saving Data

4.2 Saving Simple Application Data

4.3 Creating and Saving Preferences

4.4 Retrieving Shared Preferences

4.5 Saving the Activity State

4.6 Saving and Loading Files

4.7 File Management Tools

4.8 Databases in Android

4.9 Introducing SQLite

4.10 Cursors and Content Values

4.11 Working with Android Databases

4.12 Introducing Content Providers

4.13 Using Content Providers

Unit 13.   **Maps, Geocoding, and Location-Based Services:**   **[8]**

5.1 Using Location-Based Services

5.2 Selecting a Location Provider

5.3 Finding the Available Providers

5.4 Finding Your Location

5.5 Tracking Movement

5.6 Using Proximity Alerts

5.7 Using the Geocoder

5.8 Reverse Geocoding

5.9 Forward Geocoding

5.10 Creating Map -Based Activities

5.11 Creating a Map-Based Activity

5.12 Using the Map Controller

5.13 Creating and Using Overlays

Unit 14. Working in the Background: **[6]**

6.1 Introducing Services

6.2 Creating and Controlling Services

6.3 Binding Activities to Services

6.4 Using Background Worker Threads

6.5 Creating New Threads

6.6 Customizing Toasts

6.7 Using Toasts in Worker Threads

6.8 Introducing Notifications

6.9 Creating Notifications

6.10 Triggering Notifications

6.11 Using Alarms

Unit 15. Peer-to-Peer Communication and Hardware Interfacing: **[4]**

7.1 Introducing Android Instant Messaging

7.2 Managing Chat Sessions

7.3 Sending and Receiving Data Messages

7.4 Introducing SMS

7.5 Using the Media APIs

7.6 Playing Media Resources

7.7 Using the Camera

7.8 Introducing the Sensor Manager

7.9 Android Telephony

7.10   Using Bluetooth

7.11   Managing Network and Wi-Fi Connections

Unit 16. Publishing apps and Cross Platform: **[4]**

8.1 Preparing for publishing

8.2 Publishing to the Android Market

8.3 Cross Platform App Development

8.4 Framework of Cross Platform

8.5 Demonstration of popular cross platform tools

Practical exercises: [45]

Lab 1:
- Setting Up the Development Environment
- Create a "Hello World" Android Application
- Install and run the application on a physical device
- Create a simple User Interface

Lab 2:
- Demonstrate Views, View Groups, Layouts, and Widgets are and how they relate to each other.
- Declare layouts dynamically at runtime.
- Use Events and Event Listeners.

Lab 3:
- Declare layouts statically as an xml resource.
- Create custom Views from scratch to suit a specific need.
- Create Options and Context Menus.
- Use Adapters and AdapterViews to bind a View class to data.

Lab 4:
- Save & restore data as Application Preferences
- Create an SQLiteDatabase
- Manage database connections
- Insert, update, remove, and retrieve data from an SQLite Database

Lab 5
- Incorporate Google Maps into an application.
- Register for and receive GPS location information.
- Create Google Maps Overlays.

Lab 6:
- Create and use ContentProviders.
- Create and use Services.
- Broadcast Intents.

Lab 7:
- Send SMS text messages.
- Register to receive information from a device's available sensors.
- Monitor the motion of a physical device.

Recommended books:
- Meier, R. (2009). Professional Android application development. Indianapolis, India: Wiley.
- Kothari , Pradeep.(2014).Android Application Development, Black Book Paperback, Dreamtech Press, India
- Barry Burd, (2015). Android Application Development All-in-One for Dummies. Wiley India Private Limited

Telecommunication

EG 3210 CT
(Elective II)

Total: 7 hour /week

Year: **III**   **Lecture: 3 hours/week**
Semester: **II**   **Tutorial: 1 hours/week**
                                                       Lab: 3 hours/week

Course Description:

This course covers basic telephone communication, cellular phone system.This course provides an introduction to the techniques of design, implementation, and analysis of telecommunications networks, telephony system, switching system which are instrumental technologies underlying many modern telecommunication systems.

Course Objectives:
After completing this course the student will able to know:
1. telephone communication
2. switching system used in telecommunication industry
3. signal switching from a systems approach
4. Integrated Services Digital Network and cellular system

Course Content:

Unit 1.   **Introduction to Telephony:**   **[4]**
          1.2   Definition and Concept
- Telecommunication Networks
- The Simple Telephone Connection
- Sources and Sinks
- Basic switching system
- Transmission bridge
- Manual Telephony

Unit 2.   **Electromechanical System:**   **[6]**
          2.1   Rotary dial Telephone
          2.2   Signaling tones
          2.3   Strowger switching system
          2.4   Principles of crossbar switching
- Crossbar switch configuration
- Crossbar exchange organization

          2.5   EMD switching system

Unit 3.   **Switching System:**   **[5]**
          3.1   Principles of common control
          3.2   Touch tone dial telephone
          3.3   Cross point technology
- No. 1 ESS
- Japanese D-10
- Metaconta

Unit 4.   **Signal Switching:**   **[8]**
          4.1   Stored program control
- Software architecture

- Application software
- Centralized SPC and Distributed SPC

  4.2   Service Networks
- Two stage Networks
- Three stage Networks
- N Stage Networks

  4.3   Basic time division space switching and Time multiplexed space switching

  4.4   Basic time division time switching and Time multiplexed time switching

  4.5   Combination switching

Unit 5.   Telephone Traffic System: [8]
  5.1   Network traffic load and parameters

  5.2   Grade of service and blocking probability
- Blocking models
- loss estimation and delay system

  5.3   Incoming traffic and service time characterization

  5.4   Subscriber loop systems
- Switching hierarchy and routing
- Transmission plan

  5.5   Signaling techniques
- In channel signaling
- Common channel signaling.

Unit 6.   Integrated Services Digital Network: [8]
  6.1   Motivation for ISDN and New services

  6.2   Network and protocol architecture
- Transmission channels
- User network interfaces
- Numbering and addressing

  6.3   ISDN standards

  6.4   Broadband ISDN and Voice data integration.

Unit 7.   Cellular Mobile Telephone: [6]
  7.1   Basic cellular system

  7.2   Mobile radio environment
- Trunking
- Efficiency
- Performance criteria

  7.3   Operation of cellular systems

Practical: [45]

1. Overview of telephone set, a fax machine, a computer modem
2. Structure and Overview of PABX system (internal switching network), Interconnecting wires and cables system
3. Logic cards, switching and control cards, power cards and related devices that facilitate PABX operation
4. Organization and safety on site, Nature of work on sites, Identification of materials
5. Switching system of telephone network
6. Designing and implementing LANs
7. Field visit in Telephone Company (switching system, transmission system, cabling system etc.)

Reference books:
1. N.N. Biswas, Principles of Telephony
2. M.T. Hills, Telecommunication Switching Principles
3. T. Viswanathan, Telecommunication Switching Systems and Networks
4. W.C.Y. Lee, Mobile Cellular Telecommunication
1. J.Y. Bryce, Using ISDN
2. J.C. Bellamy, Digital Telephony.

Cyber Security and Social Ethics
EG 3211CT

Year: **III**
Semester: **II**

Total: 3 hour /week
Lecture: 3 hours/week
Tutorial: hours/week
Practical: hours/week
Lab: hours/week

Course Description:

This course is designed to provide the knowledge of fundamental aspects of Cyber Security and professional ethics in cyber world. Security is also an essential part of e-Enable Services, in the enterprise and over networks has become the primary concern. The course will provide knowledge to the students about how information can be protected throughout application, organization and computer networks and will help them to understand the social and professional cultural, social, legal, and ethical issues as well. The student will discuss on different types of cyber security issues, secure techniques, security and cryptography, legal issues in cybercrime, incidents and cyber forensic, ethical issues in cyber world, Professional ethics and Risk and liability in the computer based System.

Course Objectives:

After completing this course the student will able to know:
- gain the knowledge of different types cyber threats and issues in computer application, organization and networks.
- gain familiarity with prevalent application, network and distributed system attacks, defenses against them, and forensics to investigate.
- develop a basic understanding of cryptography
- develop an understanding of security policies such as authentication, integrity and confidentiality as well as protocols to implement.
- help the students to understand their own limitations as well as the limitations of their tools all practitioners must make a long-term commitment to remaining current in their chosen specialties and in the discipline of computing as a whole.

Course Contents:

Unit 1.   **Introduction to Cyber Security:**   **[5]**
             1.1   Concept of Cyber Security
             1.2   Cyber Crimes
             1.3   Types of Attacks in cyber
             1.4   Hacker Techniques

Unit 2.   **Security Technologies:**   **[7]**
             2.1   Virtual Private Networks

2.2   Encryption

2.3   Intrusion Detection

2.4   Anti-Malicious Software

2.5   Secure Software & Browser Security

2.6   SSL and IPSec

2.7   Firewalls

Unit 3.   Information Security and Cryptography: **[7]**

3.1   Classical Encryption Methods

3.2   Asymmetric Key Cryptography

3.3   Confidentiality, Integrity, Authentication and Non-Repudiation

3.4   Digital Signature

Unit 4.   Legal Issues in Cyber Crime: **[5]**

4.1   Legal Issues in Information Security

4.2   Cyber Law in Nepal

4.3   Security Policy

4.4   Managing Risk

4.5   Information Security Process

4.6   Information Security Best Practices

Unit 5.   Forensics and Incident Analysis   **[7]**

5.1   Forensic Technologies

5.2   Digital Evidence Collection

5.3   Evidentiary Reporting

5.4   Incident Preparation

5.5   Incident Detection and Analysis

5.6   Containment, Eradication, and Recovery

5.7   Proactive and Post Incident Cyber Services

Unit 6.   Ethics in Cyber security & Cyber Law   **[5]**

6.1   Privacy

6.2   Intellectual Property

6.3   Professional Ethics

6.4   Freedom of Speech

6.5   Fair User and Ethical Hacking

6.6   Trademarks

6.7   Internet Fraud

6.8   Electronic Evidence

Unit 7.   Professional and Ethical Responsibilities: **[5]**

7.1   Community values and the laws by which we live

7.2   The nature of professionalism in IT

7.3   Various forms of professional credentialing

7.4   The role of the professional in public policy

7.5   Maintaining awareness of consequences

7.6   Ethical dissent and whistle-blowing

7.7   Codes of ethics, conduct, and practice (IEEE, ACM, SE, AITP, and so forth)

7.8   Dealing with harassment and discrimination

Unit 8.   Risks and Liabilities of Computer-Based Systems: [4]

8.1   Software risks

8.2   Safety and the engineers

8.3   Implications of software complexity

8.4   Risk assessment and management

Recommended books:

1   Eric Maiwald, Fundamentals of Network Security, McGraw-Hill Education
2   Patel, D. R. (2008). *Information security: theory and practices*. New Delhi: Prentice-Hall of India.
3   Social, Legal and Ethical Issues for Computers and the Internet by Sara Baase.
4   Ethics of Computing: Codes, spaces for discussion and law by Jacques Berleur and Klaus Brunnstein Chapman & Hall.
5   Joseph Migga Kizza, Ethical and Social Issues in the Information Age

Major Project

EG 3212 CT

Total: 8 hour /week

Year: III

Semester: II

Lecture: hours/week
Tutorial: hours/week
Practical: 8 hours/week
Lab: hours/week

Course Description:

The main aim of this course is to plan and complete project work, related with Information Technology under the supervision of an instructor or a supervisor.

Course Objectives:

On completion of this course, the students will be able to:

1. develop the ability to tackle individually a selected problem to a reasonable depth of understanding
2. develop the ability to organize and produce a professional product using an engineering approach
3. develop the ability to produce technical documentation to a high standard
4. develop the ability to produce an analytical report which explains the work carried out by the students in the project and the final product they have developed

1. Group formation (Maximum 4 persons / group)
2. Project concept development
    a. Finding Project concept
    b. Scope of project
    c. Completion time
3. Proposal preparation
4. Defense (mid-term, should complete literature review, methodology, project design)
5. Project documentation (must follow project documentation guide line given by supervisor or the department)
6. Submission of hard cover project document

Description of the Project Work:

The work carried out must be a practical, problem-solving project. It should be a realistic project in the sense that the product should be useful practically as far as possible.

The project should:
*   be intended to develop an IT solution to a practical problem
*   be carried out using an engineering approach
*   emphasize design
*   be carried out individually
*   Normally result in the production of a piece of software
*   include appropriate technical documentation

- be fully described from inception to completion in a written report produced to a good level of professional competence

Procedure:
1. A detailed project proposal to be submitted to the project supervisor for the approval of project work. (10 percent marks for the proposal.)
2. A mid-term progress report to be submitted to the supervisor. The supervisor must hold an oral presentation of about 10 minutes to evaluate the mid-term progress of the project work..(35 percent mark)
3. A final written report will be submitted at the end of project work. There will be a final oral group presentation of about 15 minutes. The project coordinator, the supervisor and the external examiner nominated by the project coordinator will evaluate the submitted report as well as the presentation. (10 percent project coordinator 20 percent supervisor and 25 percent external examiner.)

Evaluation Scheme

The project coordinator, the supervisor and the external examiner should evaluate the project work and presentation by the following criteria:
   i.   quality of presentation (20%)
   ii.   understanding of project work and related theory (40%)
   iii.   final expected result of the project (20%)
   iv.   usefulness of the project (10%)