

CURRICULUM

DIPLOMA

Computer Engineering

(Three Years Program- Semester System)



Council for Technical Education and Vocational Training

Curriculum Development Division

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Introduction

This three years Diploma in Computer Engineering curriculum is designed to produce middle level skilled technician updated with latest skills of computer and information technology with a view to cope with the emerging technological change. Many people in the developed, developing and under developed countries have been given emphasis for the broader application of computer. Computer Engineering has been contributing the world for the overall development and creating job or employment opportunities in both public and private sectors.

This curriculum is designed to foster knowledge and skills to the technician required by the computer engineering and information technology related industries and organizations in Nepal. The Diploma in Computer Engineering 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 courses includes the basic science subjects like physics, chemistry, and mathematics applicable in the field of computer Engineering. It also includes language subjects like Nepali and English applicable for the communication in the field of computer engineering and information technology. The second year courses focuses on the basic disciplinary subjects of computer engineering. Similarly, third year courses comprises of the disciplinary subjects and the application of learned skills and knowledge by making the provision of major and minor projects as well as elective subjects in the specific areas of computer engineering.

The course structure and the subject-wise contents that follow reflect the details of this curriculum. In short, this curriculum guides its implementers to produce competent and highly employable middle level technical human resources in the field of computer engineering.

The contents of each subjects prescribed in the curriculum are incorporated in the light of "must to know and must to do" principle. The contents of the curriculum are minutely describes in micro level.

Curriculum Title:

Diploma in Computer Engineering

Aim

The program aims to produce middle level technical personnel in the field of computer with sound academic knowledge equipped with perfect technical skills that can be faced in real life situation.

Objectives

After the completion of this program, the graduates will be enabled to:

- Prepare competent computer workforce/human resources that could provide services in public and private organizations as required
- Handle Web Technology & Programming, Management Information System, System Analysis and Design, Visual Programming, Multimedia Technology, Internet Technology, Data Mining, Computer Graphics etc.
- Management of Database
- Repair and Maintenance of Computer

- Applied Telecommunication skills
- Prepare such technical workforce who will demonstrate positive attitude and respect to the profession and socio-cultural values.
- Reduce the dependence on foreign technicians.
- Create self employment/enterprise.

Group Size

The group size will be maximum of 48 (forty eight) students in a batch.

Entry Criteria

- SLC Pass or SEE with minimum C grade in Compulsory Mathematics & Science and D+ in English.
- TSLC in Computer Engineering with minimum 67.00%.
- Should pass entrance examination as administered by CTEVT.

Duration

The total duration of this curricular program is three academic years (six semester). The program is based on semester system. Moreover, one semester year consists of 19.5 academic weeks including evaluation period. Actual teaching learning hours will be not less than 15 weeks in each semester.

Medium of Instruction

The medium of instruction will be in English and/or Nepali.

Pattern of Attendance

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

Teachers and Students Ratio

The ratio between teachers and students must be:

- Overall ratio of teacher and student must be 1:12 (at the institution level)
- 1:48 for theory and tutorial classes
- 1:12 for practical/demonstration
- 1:6 for bench work
- 75 % of the technical teachers must be full timer

Qualification of Teachers and Instructors

- The program coordinator should be a master's degree holder in the related area.
- The disciplinary subject related teacher and demonstrators should be a bachelor's degree holder in the related area.
- The foundational subject related teacher should be master degree holder in the related area.

Instructional Media and Materials

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

- **Printed Media Materials** (Assignment sheets, Hand-outs, Information sheets, Individual training packets, Procedure sheets, Performance check lists, Textbooks etc.).
- **Non-projected Media Materials** (Display, Flip chart, Poster, Writing board etc.).
- **Projected Media Materials** (Opaque projections, multimedia, Slides etc.).
- **Computer-Based Instructional Materials** (Computer-based training, Interactive video etc.)

Teaching Learning Methodologies

The methods of teachings for this curricular program will be a combination of several approaches such as; lecture, illustrated talk, tutorial, group discussion, demonstration, simulation, guided practice, self-practice, fieldwork, block study, industrial practice, report writing, term paper presentation, heuristic and other independent learning exercises.

Theory: Lecture, discussion, assignment, interaction, seminar, group work.

Practical: Demonstration, observation, simulation, guided practice, self-practice, industrial practice and project work.

Mode of Education

There will be inductive and deductive mode of education.

Examination and Marking Scheme

a. Internal assessment

- There will be a transparent/fair evaluation system for each subject both in theory and practical exposure.
- Each subject will have internal assessment at regular intervals and students will get the feedback about it.
- Weightage of theory and practical marks are mentioned in course structure.
- Continuous assessment format will be developed and applied by the evaluators for evaluating student's performance in the subjects related to the practical experience.

b. Final examination

- Weightage of theory and practical marks are mentioned in course structure.
- Students must pass in all subjects both in theory and practical for certification. If a student becomes unable to succeed in any subject, s/he will appear in the re-examination administered by CTEVT.
- Students will be allowed to appear in the final examination only after completing the internal assessment requirements.

c. Requirement for final practical examination

- Professional of relevant subject instructor must evaluate final practical examinations.
- One evaluator in one setting can evaluate not more than 24 students.
- Practical examination should be administered in actual situation on relevant subject with the provision of at least one internal evaluator from the concerned or affiliating institute led by external evaluator nominated by CTEVT.
- Provision of re-examination will be as per CTEVT policy.

d. Final practicum evaluation will be based on:

- Institutional practicum attendance - 10%
- Logbook/Practicum book maintenance - 10%
- Spot performance (assigned task/practicum performance/identification/arrangement preparation/measurement) - 40%
- Viva voce :
 - Internal examiner - 20%
 - External examiner - 20%

e. Pass marks:

- The students must secure minimum 40% marks in both theory and practical. Moreover, the students must secure minimum pass marks in the internal assessment and in the semester final examination of each subject to pass the subject.

Provision of Back Paper

There will be the provision of back paper but a student must pass all the subjects of all semester within six years from the enrollment date; however there should be provision of chance exam for final semester students as per CTEVT rules.

Disciplinary and Ethical Requirements

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

Grading System

The following grading system will be adopted:

- Distinction: 80% and above
- First division: 65% to below 80%
- Second division: 50 % to below 65%
- Pass division: Pass marks to Below 50%

Certification and degree awards:

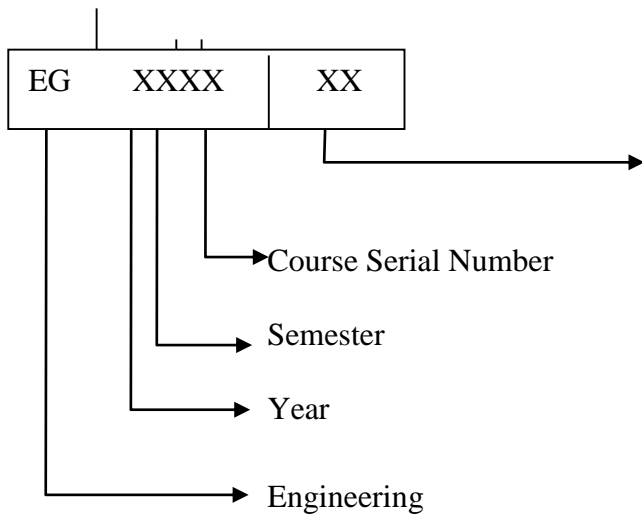
- Students who have passed all the components of all subjects of all 6 semester are considered to have successfully completed the program.
- Students who have successfully completed the program will be awarded with a degree of "**Diploma in Computer Engineering**".

Career Opportunity

The graduates will be eligible for the position equivalent to Non-gazette 1st class/Level 5 (technical) as prescribed by the Public Service Commission of Nepal and other related agencies. The graduate will be eligible for registration with the related professional council in the grade as provisioned in the related Council Act (if any).

Subjects Codes

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



Offering Departments:

AR: Architecture

EE: Electrical Engineering

ME: Mechanical Engineering

EX: Electronics Engineering

CT: Computer Engineering

CE: Civil Engineering

SH: Science and Humanities

MG: Management

SH: Science and Humanities

Provision of specialization:

There will be no provision of specialization but some subjects are offered here as the elective subjects; viz Geographical Information System, Computer Simulation and Modeling, Java Programming, E-governance, E-commerce and embedded system.

Course Structure (Diploma in Computer Engineering)

Year: I

Semester: I

Teaching Schedule			Mode					Distribution of Marks							Remarks
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total Marks	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 1101 SH	Communication Nepali	2				2	10	40	1.5				50	Continuous Assessment
2	EG 1102 SH	Communication English	2				2	10	40	1.5				50	
3	EG 1103 SH	Engineering Mathematics I	4	1			5	20	80	3				100	
4	EG 1104 SH	Engineering Physics I	3	1		2	6	20	60	3	10	10	2	100	
5	EG 1105 SH	Engineering Chemistry I	3	1		2	6	20	60	3	10	10	2	100	
6	EG 1107 CT	Computer Fundamentals	3		3		6	20	80	3	30	20	3	150	
7	EG 1104 AR	Engineering Drawing	1		3		4	0	0		60	40	4	100	
8	EG 1109 CT	Computer Programming in C	3	2	3		8	20	80	3	30	20	3	150	
Total			21	5	9	4	39	120	440		140	100		800	

Year: I

Semester: II

Teaching Schedule			Mode					Distribution of Marks							Remarks
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 1201 SH	Engineering Mathematics II	3	1			4	20	80	3				100	Continuous Assessment
2	EG 1202 SH	Engineering Physics II	3	1		2	6	20	60	3	10	10	2	100	
3	EG 1203 SH	Engineering Chemistry II	3	1		2	6	20	60	3	10	10	2	100	
4	EG 1211 CT	Digital Logic	3		2		5	20	80	3	30	20	3	150	
5	EG 1205 CT	Object Oriented Programming with C++	3		3		6	20	80	3	30	20	3	150	
6	EG 1207 EE	Electrical Engineering	3		3		6	20	80	3	30	20	3	150	
7	EG 1215 CT	Web Technology & Programming I	3		4		7	20	80	3	30	20	3	150	
Total			21	3	12	4	40	140	520		140	100		900	

Year: II

Semester: III

Teaching Schedule			Mode					Distribution of Marks						Remarks	
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 2101 CT	Web Technology & Programming II	3	1	3		7	20	80	3	30	20	3	150	Continuous Assessment
2	EG 2104 SH	Engineering Mathematics III	3	1			4	20	80	3				100	
3	EG 2105 CT	Data Structure & Algorithm	3	1	3		7	20	80	3	30	20	3	150	
4	EG 2107 CT	Database Management System	3	1	3		7	20	80	3	30	20	3	150	
5	EG 2107 EX	Microprocessors	3	1	3		7	20	80	3	30	20	3	150	
6	EG 2108 EX	Electronic Devices & Circuits	4	1	3		8	20	80	3	30	20	3	150	
Total			19	6	15		40	120	480		120	100		850	

Year: II

Semester: IV

Teaching Schedule			Mode					Distribution of Marks						Remarks	
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 2211 EX	Data Communication	3	1	3		7	20	80	3	30	20	3	150	Continuous Assessment
2	EG 2212 CT	System Analysis and Design	2		3		5	20	80	3	30	20	3	150	
3	EG 2213 CT	Visual Programming	3		3		6	20	80	3	30	20	3	150	
4	EG 2214 CT	Computer Architecture	3		3		6	20	80	3	30	20	3	150	
5	EG 2215 CT	Computer Repair & Maintenance	3		3		6	20	80	3	30	20	3	150	
6	EG 2216 CT	Computer Graphics	2		3		5	10	40	1.5				50	
7	EG 2207 SH	Statistics & Probability	3	1			4	20	80	3				100	
Total			19	2	18		39	130	520		150	100		900	

Year: III

Semester: V

Teaching Schedule			Mode					Distribution of Marks						Remarks	
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 3101 CT	Computer Networks	3		3		6	20	80	3	30	20	3	150	Continuous Assessment
2	EG 3111 CT	Management Information System	3		2		5	20	60	3	10	10	2	100	
3	EG 3112 CT	Applied Telecommunication	3		3		6	20	80	3	30	20	3	150	
4	EG 3113 CT	Distributed Computing	3		3		6	20	80	3	30	20	3	150	
5	EG 3114 CT	Operating System	3		3		6	20	80	3	30	20	3	150	
6	EG 3115 CT	Cyber Security and Social Ethics	2				2	10	40	1.5	-	-	-	50	
7	EG 3116 CT	Elective – I (any one)	4		3		7	20	80	3	30	20	3	150	
		(a) Geographical Information System												0	
		(b) Computer Simulation and Modeling												0	
		(c) Java Programming												0	
8	EG 3117 CT	Minor Project			2		2				30	20	3	50	
Total			21		19		40	130	500		190	130		950	

Year: III

Semester: VI

Teaching Schedule			Mode					Distribution of Marks						Remarks	
S. N.	Course Code	Subject Title	L	T	P	Lab	Total Hours	Theory			Practical			Total	
								Assess. Marks	Final Marks	Exam Hours	Assess. Marks	Final Marks	Exam Hours		
1	EG 3201 CT	Multimedia Technology	3	1	3		7	20	80	3	30	20	3	150	Continuous Assessment
2	EG 3211 CT	Internet Technology	3	1	3		7	20	60	3	10	10	2	100	
3	EG 3212 CT	Data Mining	3	1	3		7	20	80	3	30	20	3	150	
4	EG 3213 CT	Software Engineering	3		3		6	20	80	3	30	20	3	150	
5	EG 3214 CT	Elective - II	4		3		7	20	80	3	30	20	3	150	
		(e) E-Governance												0	
		(f) E-commerce												0	
		(g) Embedded System												0	
6	EG 3215 CT	Major Project			6		6				60	40	4	100	
Total			16	3	21		40	100	380		190	130		800	

First Year
(First and Second Semesters)

First Semester

Subjects:

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 1107 CT	Computer Fundamentals
7	EG 1104 AR	Engineering Drawing
8	EG 1109 CT	Computer Programming in C

कम्युनिकेसन नेपाली ई.जी. ११०१ एस.एच.

वर्ष : प्रथम
सेमेष्टर : प्रथम

जम्मा: २ घण्टा/हप्ता
प्रवचन: २ घण्टा/हप्ता

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: सञ्चारात्मक 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 चिठी र निवेदन आदि)**
- २.६ **संवाद लेखन**

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

३.१ कृति परिचयको ढाँचा :

- 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, इन्जिनियरिङ 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

Year: I
Semester: I

Total: 2 hour/week
Lecture: 2 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 Memo
- 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. Taylor, 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, Higgs, Jonathan & Middlemiss, Nigel, Function of English, Oxford University Press
8. Naterop, Jean, Reuell, Rod, Telephoning in English, Cambridge University 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

Year: I
Semester: I

Total: 5 hour /week
Lecture: 4 hours/week
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:

1. Explain the concepts of the followings terminologies:
2. Apply them in the field of related engineering area:
 - Trigonometric ratios and equations,
 - inverse circular functions and properties of triangles
 - Straight lines, angle between lines, circle and parabola
 - The progressions, permutations and combinations, binomial theorem, exponential and logarithmic series as well as the quadratic and polygonal equations.
 - 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, $C_p - C_v = R$.
 - 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.

Textbooks

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

References:

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

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 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 H₂, O₂, and Cl₂
 - 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, gram per 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. H₂, O₂, N₂, CH₄, H₂O, NH₃, C₂H₂
 - Coordinate co-valency eg. H₂O₂, SO₂, O₃, SO₃)
 - Electronic dot structure of some compounds eg. H₂SO₄, CaCO₃, K₂SO₃
- 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 O₂, O₃, oxyacids, halogens, K₂Cr₂O₇, KMnO₄
 - Reducing agent: Definition and eg. H₂, H₂S with some examples,
 - auto-oxidation eg. H₂O₂, HNO₂, SO₂
 - 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 to 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 (CuSO₄, Zn, Mg, Al, Fe, CCl₄, C₆H₆, C₂H₅OH) [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.

Computer Fundamentals

EG 1107 CT

Year: I
Semester: I

Total: 6 hours/week
Lecture: 3 hours/week
Tutorial: 0 hours/week
Practical: 3 hours/week

Course Description:

This course is designed to provide knowledge on fundamental concept of computer, hardware components, software, electronic mail, internet, concept of multimedia and computer viruses. This course specifically designed to acquire basic knowledge of different kinds of hardware and software associated with it. It also provides knowledge of different kinds of operating system installation process. It also provides skills on word processing, spreadsheet, presentation tools and database package. This subject covers a foundation understanding of computer architecture, software, operating system, peripherals, computer virus, email and internet.

Course Objective:

After completing this course, the student will be able to:

1. Explain the history and generation of computer.
2. Develop the knowledge of computer architecture.
3. Develop the concept of computer hardware and different types of software.
4. Perform application software such as word processor, spreadsheets, presentation tools and database packages
5. Install different version of operating system in computer.
6. Explore the world by Internet and email.
7. Apply multimedia.
8. Protect their computer by using antivirus software etc.

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction:	1.1 Introduction to computers 1.2 History of Computers 1.3 In Mechanical Era: -Abacus, Napier's bones, Pascaline, 1.4 Difference engine and analytical engine, Punched card. 1.5 Computer history of Nepal 1.6 Generation of Computer	4hrs		
2	Basic Computer Organization:	2.1 Block diagram of computer 2.2 Characteristics of computer 2.3 Classification of computers: 2.3.1 According to working principle of computer <ul style="list-style-type: none">• Analog computer• Digital computer• Hybrid computer	6hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		2.3.2 According to size and speed of computer <ul style="list-style-type: none"> • Mini computer • Micro computer • Mainframe computer • Super computer 			
3	Computer Hardware:	3.1 Introduction to Hardware 3.2 Components of computer system <ul style="list-style-type: none"> • Input Devices: Keyboard, mouse, scanner, digitizer, electronic card reader, speech recognition, webcams, etc. • Output Devices: Monitor, printers, plotter, multimedia projector, voice response system, etc. • Storage Devices: <ul style="list-style-type: none"> ○ Primary storage device: RAM, ROM and its types ○ Secondary Storage device: Magnetic disk, Optical disk and its types • Central Processing Unit(CPU): <ul style="list-style-type: none"> ○ Arithmetic Logic Unit (ALU) ○ Control Unit(CU) 	8hrs		
4	Application Packages:	4.1 Word processor packages: <ul style="list-style-type: none"> • Create,open,close, save, save as, edit,deleteddocuments • Copy,cut,paste,undo,redo text • Insert menu • Page view • Page layout • Page Design • Macros • Mail Merge 4.2 Spreadsheet packages: <ul style="list-style-type: none"> • Workbook and worksheets • Formula Bar • Create, save, open, close, insert worksheet • Filter and sort data • Present Charts/ Data • Import/Export data 4.3 Presentation packages: <ul style="list-style-type: none"> • Create slide • Format slide 	10 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		<ul style="list-style-type: none"> • Layout slide • Design slide • Slide show • Animation slide • Transition slide 4.4 Database packages: <ul style="list-style-type: none"> • Define database • Create database : Tables, Forms/Report • Define Query 			
5	Operating System overview:	5.1 Introduction to operating system :(DOS, WINDOWS, UNIX, LINUX) 5.2 Function of Operating system 5.3 Types of Operating system <ul style="list-style-type: none"> • Single user operating system • Multi user operating system • Real time operating system • Multitasking operating system 5.4 Internal and External MS-DOS Command	6 hrs		
6	Introduction to Email and Internet:	6.1 Concept of Electronic-mail and use 6.2 E-mail ethics 6.3 Advantages and Disadvantages of email 6.4 Introduction of Internet and Intranet 6.5 Define computer network and its type: LAN, MAN, WAN 6.6 Search Engine	4hrs		
7	Multimedia and its tools:	7.1 Introduction of Multimedia 7.2 Components of Multimedia: Audio, Video, Image and Graphics 7.3 Application of Multimedia 7.4 Advantages and Disadvantage of multimedia	[3 hrs]		
8	Computer virus:	8.1 Introduction of viruses 8.2 Categories of viruses: <ul style="list-style-type: none"> • Boot sector viruses • Program viruses • Macro viruses 8.3 Virus Prevention guidelines 8.4 Antivirus Software	4 hrs		
9	PRACTICAL	Perform the following tasks:	[60 hrs]		

Units	Topics	Contents	Hours	Methods/ Media	Marks
<p>Identify the hardware components.</p> <ol style="list-style-type: none"> 1. Install different version of operating system like windows 7,8,10 and Linux 2. partitioning / formatting the hard disk 3. Install device drivers on computer 4. Install of office package application programs. 5. Uses of Internal and External DOS commands. 6. Create an Email ID Such as Google account, Microsoft account and so on. 7. Create, sent and customized web based email account. 8. Apply safety precaution using different types of antivirus software 9. Create user accounts and restrict permissions on control panel 10. Working on word processor package: <ol style="list-style-type: none"> a. Format page: <ul style="list-style-type: none"> • Layout of word processor • Open, save, save as, edit file • Text formatting • Adjust margin • Insert Header and footer • Add page numbers • Insert Clip Art • Insert page break • Page orientation • Create graphics and word art b. Edit documents <ul style="list-style-type: none"> • Find and replace • Spell check c. Design table <ul style="list-style-type: none"> • Create a table • Add formula • Split cells d. Print and preview of page e. Advance operations <ul style="list-style-type: none"> • Use templates • Auto correction • Auto formatting 11. Working on Spreadsheet package: <ol style="list-style-type: none"> a) Excel Basic <ul style="list-style-type: none"> • Enter and edit data • Filter data and manipulate in table • Search and replace data • Save and protect workbook • Sorting data in ascending and descending order b) Excel Chart <ul style="list-style-type: none"> • Present charts/data 					

Units	Topics	Contents	Hours	Methods/ Media	Marks
		<ul style="list-style-type: none"> • Chart wizards • Resizing and moving charts <p>c) Format and printing worksheets</p> <ul style="list-style-type: none"> • Page setup • Column width and row height • Alignments • Get print and preview <p>d) Calculation in worksheet</p> <ul style="list-style-type: none"> • Use Formula in formula bar • Apply the function <p>12. Working on presentation package:</p> <ul style="list-style-type: none"> • Create; open, save, close, delete, insert presentation slide. • Change and view slide sorter view • Format slide • Layout slide • Insert Pictures or clip art • Apply Design templates • Apply Animation on slide • Setting direction and speed of slide • Apply Transition on slide • Create slide master • View the slide master elements • Preview and printing a slide presentation <p>13. Working on Database package:</p> <ul style="list-style-type: none"> • Create Database • Create and manipulate database tables • Use Query • Design Forms/Report 			

Note: *students should be present regular attendance, discipline, and submit their lab report to the teachers.*

Text books:

- Alexis Leon & Mathews Leon (2009). Fundamentals of Information Technology, 2/e. New Delhi. Vikas Publishing House (unit 1-5)
- Morley, D. &. (2013). *Understanding Computers Today and Tomorrow*. Cengage Learning.
- Sinha, P. K., & Sinha, P. (2007). Computer fundamentals: concepts, systems & applications. New Delhi: BPB Publications.

Engineering Drawing

EG 1104 AR

Year: I
Semester: I

Total: 4 hour /week
Lecture: 1 hours/week
Tutorial: hours/week
Practical: 3 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. Present different shapes accurately.
2. Apply geometrical constructions, project point, line, plane and geometrical solids.
3. Present three dimensional objects in orthographic from 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 Exercise on drawing horizontal, vertical and inclined lines and conventional line types [*Sheet 1*]

Unit 2. Technical Lettering: [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 Lettering using templates
- 2.4 Exercise on freehand technical lettering and lettering using templates [*Sheet 2*]

Unit 3. Geometrical Construction: [12]

- 3.1 Construction on straight lines and angles
Bisection and trisection of a straight line, Bisection and trisection of an angle, To draw perpendicular lines, To draw parallel lines, To divide a straight line

into any number of equal parts, To divide a straight line proportionately, To draw an angle equal to given angle

3.2 Construction of polygons

To draw triangles, To inscribe a circle of a triangle and circumscribe a circle about a given circle, To draw squares, To draw a regular polygon, To draw a regular hexagon, To draw a regular octagon, To draw a regular polygon (general method)

3.3 Exercise on construction on straight lines and angles and construction of polygons [Sheet 3]

3.4 Construction on circular arcs and circles

To determine center of a given arc, To draw a circle passing through three given points, To draw an arc tangent to given two straight lines, To draw an arc tangent to given straight line and a given circle or circular arc, To draw an arc tangent to given two circles or circular arcs, To draw open belt and cross belt tangents, To draw an ogee curve between two parallel lines

3.5 Exercise on construction on circular arcs and circles [Sheet 4]

3.6 Construction of standard curves

Construction of parabola, ellipse, hyperbola, cycloid, helix, spiral, involute

3.7 Exercise on construction of standard curves [Sheet 5]

Unit 4. Dimensioning: [4]

4.1 Dimensioning terms and notations

4.2 Techniques of dimensioning: Size and location dimensioning

4.3 Placement of dimensions: Aligned and Unidirectional system

4.4 Rules for dimensioning and conventions

4.5 Exercise on dimensioning of two dimensional figures including straight line, angles, circles, circular arcs [Sheet 6]

Unit 5. Projection of Points, Lines and Planes: [8]

5.1 Principle of projection

5.2 Principle planes of projections, four quadrants

5.3 Projection of point

Projection of point on two planes of projection, Projection of point on three planes of projection

5.4 Projection of line

Projection of line perpendicular to VP, Projection of line perpendicular to HP, Projection of line parallel to both VP and HP, Projection of line parallel to VP and inclined to HP, Projection of line parallel to HP and inclined to VP, Projection of line inclined to both VP and HP

5.5 Exercise on projection of point and line [Sheet 7]

5.6 Projection of plane

Projection of plane parallel to VP, Projection of plane parallel to HP,
Projection of plane perpendicular to both VP and HP, Projection of plane
perpendicular to VP and inclined to HP, Projection of plane perpendicular to
HP and inclined to VP

- 5.7 True Length of an Oblique Line
- 5.8 True shape of an Oblique Plane
- 5.9 Exercise on projection of plane; true length of an oblique line; true shape of an oblique plane [Sheet 8]

Unit 6. Projection of Geometrical Solids: [4]

- 6.1 Types of Solids: Polyhedra and Solids of revolution
- 6.2 Projection of geometrical solids: Prism, Cylinder, Pyramid and Cone
- 6.3 Projection of points on the surfaces solids
- 6.4 Exercise on projection of cylinder, prism, cone and pyramid; Projection of points on the surfaces of these solids [Sheet 9]

Unit 7. Orthographic Projection: [20]

- 7.1 Principle of Orthographic Projection
- 7.2 Systems of Orthographic Projection: First Angle and Third Angle
- 7.3 Making an Orthographic Drawing
- 7.4 Analysis in Three Views
- 7.5 Exercise on orthographic projection of rectangular objects with horizontal and vertical plane surfaces [Sheet 10]
Exercise on orthographic projection of rectangular objects with inclined plane surfaces [Sheet 11]
Exercise on orthographic projection of objects with cylindrical surfaces [Sheet 12 &13]
Exercise on orthographic projection and dimensioning [Sheet 14]

Unit 8. Freehand Sketching: [4]

- 8.1 Techniques of Sketching: Pencil hardness, paper with grid or lines
- 8.2 Techniques for horizontal and vertical lines; arcs and circles
- 8.3 Exercise on freehand sketches of different shapes with lines, arcs, and circles [Sheet 15]

Reference books:

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. Kataria & Sons, New Delhi, 2004/2005

Computer Programming in C

EG 1109 CT

Year: I
Semester: I

Total: 8 hour /week
Lecture: 3 hours/week
Tutorial: 2 hours/week
Practical: 3 hours/week

Course Description:

This course deals with the computer fundamentals, problem solving method. It covers basic input and output, structured programming fundamentals, functions, arrays, strings, pointers, structures and file handling using C programming language.

Course Objective:

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

- 1 Describe basic programming concepts and terms.
- 2 Explain and apply various data types and operators used in C.
- 3 Develop the working knowledge of problem solving by using the computer methods, systems and languages.
- 4 Apply conditional and looping statements while developing programs.
- 5 Create modular programs using function.
- 6 Make and apply programs using array, strings, structure and union.
- 7 Apply pointers in developing programs.
- 8 Operate Read and write mode to data file in C.

Course Contents:

Units	Topics	Contents	Hours	Methods /Media	Marks
1	Computer Programming Basics:	1.1 Program, Programming, Programming language and its types 1.2 Language translators (Assembler, Compiler, Interpreter) 1.3 Program Design Tools (Algorithm, Flowchart and pseudo code)	3hrs		
2	Introduction to C:	2.1 History 2.2 Character Set, Tokens, Keywords, Identifiers 2.3 Constants and its types, Variables, Rules for naming Variables 2.4 Operators and its types 2.5 Expression 2.6 Data types	6hrs		

Units	Topics	Contents	Hours	Methods /Media	Marks
		2.7 Precedence and Associativity 2.8 Escape Sequence			
3	Basic Input and Output:	3.1 Formatted Input/ Output functions (scan (), print ()) 3.2 Unformatted Input / Output functions (getchar (), putchar (), gets (), puts())	3 hrs		
4	Structured Programming Fundamentals:	4.1 Control Structure (Sequence, Selection, Loop) 4.2 Conditional Statements (if, if...else, if...else if, nested if...else, switch) 4.3 Loop (for, while, do – while) 4.4 Nested loop 4.5 Break and continue statement	10hrs		
5	Functions:	5.1 Introduction 5.2 Function Components (Function Prototypes, Call and Definition) 5.3 Types of function on the basis of return type and arguments 5.4 Call by value and call by reference 5.5 Recursion	4 hrs		
6	Arrays and Strings	6.1 Introduction to Array 6.2 Types of Array (One Dimensional, Multi Dimensional, Static) 6.3 Dynamic Array (Introduction only) 6.4 Passing Array to Function 6.5 Introduction to String 6.6 Handling Functions (strcpy(), strlen(), strcmp(), strrev(), strlwr(),strupr())	8hrs		
7	Pointer	7.1 Introduction to pointer 7.2 Pointer Arithmetic 7.3 Relation between pointer and Array 7.4 Dynamic Memory Allocation	4hrs		
8	Structure and Union	8.1 Introduction to Structure 8.2 Declaring and Defining Structures 8.3 Accessing Structure member	4 hrs		

Units	Topics	Contents	Hours	Methods /Media	Marks
		8.4 Introduction to Nested Structure 8.5 Arrays of Structures 8.6 Union: Declaring and defining Union, Accessing Union member 8.7 Difference between Structure and Union			
9	Files and Files Handling in 'C':	9.1 Introduction to data file 9.2 Opening and closing sequential files 9.3 Modes of opening file (r, w, a) 9.4 Processing file	3 hrs		
10	Practical		45 hrs		
<p>Perform the following tasks using C:</p> <ol style="list-style-type: none"> 1. Write programs to implement sequential structure. 2. Write programs to implement conditional and iterative structure. 3. Write programs using array and strings. 4. Write programs using pointer. 5. Write programs using structure and union. 6. Write programs using functions. 7. Write programs to read from and write to data file. 					

Reference books:

- Kanetkar, Y. P. (2008). *Let us C* 8th Ed, New Delhi, BPB Publication
- Baral, D.S., Baral, D. & Ghimire S. K, The secrets of C programming language. Kathmandu, Bhundi Purana Prakasan.
- Balagurusamy, E. (2007). *Programming in ANSI C*. New Delhi, India: Tata McGraw-Hill.
- Raman, R. (1984). *Computer programming in C*, New Delhi, PHI. India
- B.S. Gottfried(2001), *Schaum's Outline Series for Programming with C*, Second Edition, Tata McGraw Hill Publishing Company, New Delhi
- Bhatta, R.D (2015), *A Text Book of C Programming*, Vidyarthi Prakashan

Second Semester

Subjects:

- 1 EG 1201 SH Engineering Mathematics II
- 2 EG 1202 SH Engineering Physics II
- 3 EG 1203 SH Engineering Chemistry II
- 4 EG 1211 CT Digital Logic
- 5 EG 1205 CT Object Oriented Programming in C++
- 6 EG 1207 EE Electrical Engineering
- 7 EG 1212 CT Web Technology & Programming I

Engineering Mathematics II

EG 1201 SH

Year: I
Semester: II

Total: 4 hour /week
Lecture: 3 hours/week
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 form $A + ib$.
 - 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 Cramer's 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
 - Riemann 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

References:

1. A Textbook on Engineering mathematics (for Diploma in Engineering) part II, Bhim Prasad kafle, Makalu Publicartion 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, Vudhyarathi 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.

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, Wheatstone bridge
 - Heating effect of current:
 - Joules law and its 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 corkscrew 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
 - Magnetic 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.
 - Polarization and unpolarized lights, polarization by reflection(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 "Sulphur dioxide")

- 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 copper
- 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, H₂SO₄(dil.)& HNO₃ (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 prepared individually in a Woulf bottle but in Kipp's apparatus commonly) [2]
8. To detect the acid radicals (Cl⁻, NO₃⁻, SO₄²⁻, CO₃²⁻) 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
6. A Text book of Engineering Chemistry, Prakash Poudel

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

Digital Logic

EG 1211 CT

Year: I
Semester: II

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

Course Description:

This course presents an introduction to Digital logic techniques and foundation in design and analysis of the operation of digital gates. it support to design and implementation of combinational and sequential logic circuits. This course also explain the concepts of Boolean algebra, Karnaugh maps, flip-flops, registers, and counters along with various logic families and comparison of their behavior and characteristics..

Course Objective:

After completing this course, the students will be able to:

1. Describe conversion of different number systems and codes
2. Explain and analysis of logic functions and gates
3. Explain combinational and sequential logic design
4. Explain Industrial application of logic system.

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction:	1.1 Analog Signal and Digital Signal 1.2 Digital logic and operation 1.3 Clock wave form, positive logic, negative logic 1.4 Propagation delay , Noise Margin	2hrs		
2	Number Systems and Codes:	2.1 Decimal Number System 2.2 Binary Number System 2.3 Octal Number System 2.4 Hexadecimal Number System 2.5 Conversions among Different Number Systems 2.5.1 Decimal to Binary, Octal and Hexadecimal 2.5.2 Binary to Decimal, Octal and Hexadecimal 2.6 Fraction Conversions from 2.6.1 Decimal to Binary , Octal and Hexadecimal 2.6.2 Binary to Decimal, Octal and Hexadecimal 2.7 BCD Code and conversion from Binary 2.8 Gray Code and conversion from Binary	6hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		2.9 Alphanumeric Code <ul style="list-style-type: none"> • ASCII Code • EBCDIC Code 			
3	Arithmetic Logic Operations:	3.1 Binary Arithmetic <ul style="list-style-type: none"> • Binary Addition • Binary Subtraction 3.2 9's and 10's Complement Method <ul style="list-style-type: none"> • 9's Complement Subtraction • 10's Complement Subtraction 3.3 1's Complement and 2's Complement Method <ul style="list-style-type: none"> • 1's Complement Subtraction • 2's Complement Subtraction 	3hrs		
4	Logic Gates:	4.1 Basic Gates: AND, OR, NOT <ul style="list-style-type: none"> 4.1.1 Logic Equations 4.1.2 Truth Table and symbol 4.2 DeMorgan's Theorems <ul style="list-style-type: none"> 4.2.1 Verification of DeMorgan's Theorem by truth Table 4.3 Universal Gates: NAND, NOR <ul style="list-style-type: none"> 4.3.1 Logic Equations 4.3.2 Truth Table and symbol 4.3.3 Verification of Universal properties of NAND and NOR gates 4.4 Exclusive Gates: XOR, XNOR 4.5 Building Logic Circuits from Logic Equations	6hrs		
5	Boolean Functions and Logic Simplification:	5.1 Boolean Algebra and its Properties/Laws 5.2 Simplification of Boolean Equations 5.3 Sum of Product (SOP) Simplification 5.4 Product of Sums (POS) Simplification 5.5 Karnaugh Map <ul style="list-style-type: none"> 5.5.1 K-Map Simplification for Two Input Variables 5.5.2 K-Map Simplification for Three Input Variables 5.5.3 K-Map Simplification for Four Input Variables 5.5.4 Maps with <i>Don't Care</i> Conditions 	6hrs		
6	Combinational Logic Circuits:	6.1 Adders <ul style="list-style-type: none"> 6.1.1 Half Adder 6.1.2 Full Adder 6.1.3 Parallel Bit Adders (3 Bits and 4 Bits) 	9hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		6.2 Subtractors 6.2.1 Half Subtractors 6.2.2 Full Subtractors 6.2.3 Parallel Bit Subtractors (3 Bits and 4 Bits) 6.3 Encoders 6.3.1 Decimal to Binary Encoder 6.3.2 Decimal to BCD Encoder 6.3.3 Encoder IC Packages 6.4 Decoders 6.4.1 Binary to Decimal Decoder 6.4.2 BCD to Decimal Decoder 6.4.3 Seven Segment Display Decoder 6.4.4 Decoder IC Packages 6.5 Multiplexers 6.5.1 4-to-1 Multiplexer 6.5.2 8-to-1 Multiplexer 6.5.3 Multiplexer Tree 6.5.4 Multiplexer IC Packages 6.6 Demultiplexers 6.6.1 Demultiplexer and Decoder Relations 6.6.2 1-to-4 Demultiplexer 6.6.3 1-to- 16 Demultiplexer 6.6.4 Demultiplexer tree and Demultiplexer in IC Packages			
7	Sequential Logic Circuits:	7.1 Latch and Flip-Flops 7.1.1 RS Flip-Flop : its symbol and Truth Table 7.1.2 Construction of RS flip-flops using NAND and NOR gates 7.1.3 Application of Clock and set and preset inputs 7.1.4 D Flip-Flop : its symbol and Truth Table 7.1.5 JK Flip-Flop: its symbol and Truth Table 7.1.6 T Flip-Flop: its symbol and Truth Table 7.1.7 JK Master-Slave Flip-Flops: its symbol and Truth Table 7.1.8 Applications of Flip-Flops 7.2 Shift-Registers 7.2.1 Flip-flop as a One-bit Memory Device	10hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		7.2.2 Right/Left Shift Registers 7.2.3 Serial-in Serial-out (SISO) Shift Register (4 bits and timing diagram) 7.2.4 Serial-in Parallel-out (SIPO)Shift Register 7.2.5 Parallel-in Serial-out (PISO)Shift Register 7.2.6 Parallel-in Parallel-out (PIPO)Shift Register 7.2.7 Applications of Shift Registers 7.3 Counters 7.3.1 Asynchronous Counters 7.3.2 Ripple Counters and timing diagram 7.3.3 Decade Counters and timing diagram 7.3.4 Ring Counters 7.3.5 Synchronous counter, Mod4,Mod 8 and Mod 10 7.3.6 Applications of Counters			
8	Digital Displays:	8.1 LED Display 8.2 LCD Display 8.3 7-Segment Display 8.4 Alphanumerical Display 8.5 Digital Clock Display Design	3 hrs		
9	Practical		30 hrs		
<p>1. Experiments on logic operation and verify with truth tables of basic gates: AND, OR, NOT, NAND, NOR</p> <ol style="list-style-type: none"> 1. Verify the universal properties of the NAND gate and NOR gate. 2. Experiments on logic operation and verify with truth tables of basic gates: XOR, XNOR Gates 3. Build logic circuits from logic equations 4. Realize the pulse operation in different logic gates 5. Realize and verify truth tables applying DeMorgan's Theorems 6. Realize and verify truth tables of binary half adder/Subtractor and full adder/Subtractor 7. Realize the function of decimal to 3-4 bit binary binary encoder 8. Realize the function of 4 bit binary binary decoder 9. Realize the function of 4-to-1 multiplexer and 1-to-4 demultiplexer circuits. 10. Realize the function of latches and flip-flops, RS,D,JK,T flip-flops 11. Realize the function shift-registers: SISO,SIPO,PISO and PIPO 12. Realize the function ripple counters 13. Realizing the function synchronous counters 14. Realizing and designing of seven-segment display-decoder logic circuit 					

Reference books:

- Malvino, A. P. (2011). Digital computer electronics. New Delhi: Tata Mcgraw Hill Education Pvt. Ltd.
- Floyd, T. L. (2015). *Digital fundamentals* (Eleventh edition). Boston: Pearson.
- Mano, M. M., Kime, C. R., & Martin, T. (2016). *Logic and computer design fundamentals* (Fifth Edition). Boston: Pearson.
- Rafiquzzaman, M. (2005). Fundamentals of digital logic and microcomputer design (5th ed). Hoboken, N.J: J. Wiley & Sons.
- Mano, M. M. (2002). Digital design (3rd ed). Upper Saddle River, NJ: Prentice-Hall.

Object Oriented Programming in C++

EG 1205 CT

Year: I
Semester: II

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

Course Description:

This course deals to develop the skill on thinking about computation and problem solving in Object Oriented Paradigms. The course helps the students to discover the basic concepts of object-oriented programming concept such as object, class, inheritance, polymorphism, abstraction and encapsulation and apply in C++.

Course Objectives:

After completing this course the students will be able to:

1. Explain object oriented programming approach
2. Design the problem and solution using object oriented design methods
3. Define various object oriented concepts such as class/object, abstraction, inheritance, operator overloading, dynamic binding, templates etc in C++ programming language

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Object Oriented Programming:	1.1. Overview of structured programming approach, problems with structured programming 1.2. Basics of object oriented programming <ul style="list-style-type: none">• Procedure oriented programming• Object oriented programming• Procedure oriented versus Object oriented programming 1.3 Characteristics of object oriented programming languages: object, class, data abstraction, polymorphism, overloading, encapsulation and inheritance 1.4 Object oriented languages 1.5 Advantage and Disadvantage of OOP	4 hrs		
2	Introduction to C++	2.1 History and Evolution of C++ 2.2 Features of C++ 2.3 Structure of C++ 2.4 C++ Vs C	2 hrs		
3	C++ Language Basics:	3.1 Character set, tokens (keywords, identifiers, operators)	7 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		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 <ul style="list-style-type: none"> • Function overloading • Default argument • Inline function • Pass by reference • Return by reference 3.12 const construct 3.13 Structure and Unions			
4	Object and Class:	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 Constant data member of a class 4.14 Constant member functions and constant objects 4.15 Friend function and friend class	8hrs		
5	Overloading Operators:	5.1 Overloadable 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)	4 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		5.6 Operator overloading using friend operator functions (unary and binary) 5.7 Fundamentals of Operator Overloading, Restriction on operator overloading			
6	Inheritance:	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 <ul style="list-style-type: none"> • Single • Multiple • Hierarchical • 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	5 hrs		
7	Virtual functions:	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	3 hrs		
8	Input/output Streams and Files:	8.1 Input/output Stream class hierarchy 8.2 Unformatted Input/output 8.3 Formatted Input/output <ul style="list-style-type: none"> • 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	6 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		8.10 File pointers and their manipulators 8.11 Testing for errors during file operations			
9	Templates:	9.1 Function Template 9.2 Overloading function template <ul style="list-style-type: none"> • Overloading with functions • Overloading with other template 9.3 Class Template 9.4 Function definition outside of the class template	3hrs		
10	Exception Handling:	10.1 Introduction to Exception. 10.2 Benefits of Exception handling. 10.3 Try and catch block. 10.4 Throw statement. 10.5 Pre-defined exceptions in C++. 10.6 Writing custom Exception class. 10.7 Stack Unwinding	3 hrs		
Practical:			[45]		

The lab exercise will be different aspects and features of the C++ programming language as follows :

1. Write a program with the structured components of the C++ language
2. Demonstrate a simple class and its implementation
3. Create classes for data types such as complex no, date, time, distance etc and implement them in a program
4. Demonstrate constructors and destructors along with the objects
5. Apply static and constant member functions and data
6. Apply friends functions to act as bridge between the objects
7. Write to overload different operators
8. Write program to convert data from user defined to fundamental data and vice versa, and user defined to user defined type
9. Write program to inherit the base class to add new functionality in the base class
10. Apply virtual functions pointer to objects in program
11. Demonstrate binary and ASCII file manipulation
12. Write a program to create and use function and class templates
13. Write a program to illustrate exception handling

Reference books:

1. Balagurusamy, E. (2013). *Object oriented programming with C++*. New Delhi: Tata McGraw-Hill
2. Robert Lafore(2003), *Object Oriented Programming in Turbo C++*, Galgotia Publications Ltd. India, 2003
3. Schildt, H. (2003). *C++: the complete reference* (4th ed). New York: McGraw-Hill.
4. Baral Dayasar & Baral Diwakar (2010), *Secrete of Object Oriented Programming in C++*, Kathmandu, Bhundipuram Prakashan

Electrical Engineering

EG 1207 EE

Year: I
Semester: II

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

Course Description:

This course focuses on familiarization of fundamental concepts in DC and AC electrical networks.

Course Objectives:

After completing this course the students will be able to:

1. Identify the basics of circuit elements and their networks
2. Familiarize with the fundamentals of electricity and electromagnetism
3. Apply the DC and AC supply.
4. Describe the electric sources and loads.

Course Contents:

- Unit 1. Electromagnetism and Electromagnetic Induction:** [6]
- 1.1. Definition of magnetic field, magnetic flux, flux density, field intensity and permeability of magnetic material
 - 1.2. Magnetic field due to current carrying conductor, force on a current carrying conductor
 - 1.3. Faraday's laws of electromagnetic induction, induced EMF, lenz's law
 - 1.4. Magnetic circuit concept, analogy to electric circuit
 - 1.5. Hysteresis loop for magnetic material, hard and soft magnetic material
- Unit 2. Electric Circuit Fundamentals:** [6]
- 2.1. Electric current and voltage
 - 2.2. Circuit elements: Resistor, Inductor, Capacitor
 - 2.3. Voltage and current sources
 - 2.4. Independent and dependent sources
 - 2.5. Series and parallel circuits
 - 2.6. Electric power and energy

- Unit 3. DC Circuit Analysis:** [7]
- 3.1. Ohm's law
 - 3.2. Kirchhoff's current and voltage laws
 - 3.3. Thevenin's theorem
 - 3.4. Norton's theorem
 - 3.5. Superposition theorem
 - 3.6. Maximum power transfer theorem
 - 3.7. Loop and nodal equations for electric networks
- Unit 4. Single Phase AC Circuit Analysis:** [8]
- 4.1. Generation of sinusoidal EMF
 - 4.2. Instantaneous, peak, average and RMS values
 - 4.3. Application of complex number, review of complex number calculation and use of j operator
 - 4.4. Phasor representation of AC quantities
 - 4.5. AC excitation for RL, RC and RLC circuits
 - 4.6. Resonance in RLC series circuit
 - 4.7. Power in AC circuits: active power, reactive power, apparent power, power triangle and power factor
- Unit 5. 3-Phase AC Circuits:** [6]
- 5.1. Generation of 3-phase sinusoidal voltage
 - 5.2. Advantage of 3-phase system
 - 5.3. Line and phase quantities (current, voltage)
 - 5.4. Star and delta connection of 3-phase source and load.
 - 5.5. Power in 3-phase circuits
- 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., Theraja, B. L., & Theraja, A. K. (2010). *A textbook of electrical technology*. Ram Nagar, New Delhi, India: S. Chand & Co.
2. Gupta, J. B. (1999). *Fundamentals of electrical engineering and electronics*. New Delhi: S.K. Kataria & Sons Publishers.
3. Del, T. V. (1984). *Principles of electrical engineering*. New Delhi: Prentice-Hall of India.
4. Cogdell, J. R. (1999). *Foundations of electrical engineering*. Upper Saddle River, N.J: Prentice Hall.

Web Technology and Programming I

EG 1212 CT

Year: I
Semester: II

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

Course Description:

This course aims at providing skills to the student to develop of modern web application and gain a broad understanding of the Web Technology. It covers the area of dynamic web development and its's features. The course initiates students to the different web development tools and technology such as HTML5, CSS, Java Script, jQuery.

Course Objectives:

After completing this course, the students will be able to:

- Familiarize with the basic technique of web technology and web page design
- Design the client side web site with features of control of client side.

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction: Internet & Web:	1.1 History Internet and Web 1.2 Introduction to WWW 1.3 Component of WWW (Web page, Web site, Homepage, protocols, web servers) 1.4 Web Browsers 1.5 Search Engines 1.6 Internet protocols and applications	5		
2	Introduction of HTML:	2.1 Introduction of HTML 2.2 Structure of HTML 2.3 Switching between opened Windows and browser (Container tag, Empty tag, Attribute) 2.4 Basic Tags of HTML: HTML, HEAD, TITLE, BODY (Setting the Fore color and Background color, Background Image, Background Sound) 2.5 Heading tag (H1 to H6) and attributes(ALIGN), 2.6 FONT tag and Attributes (Size: 1 to 7 Levels, BASEFONT, SMALL, BIG, COLOR)	15		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		2.7 Paragraph Formatting (P)and Break Line BR 2.8 Comment in HTML (<! >) 2.9 Formatting Text (B, I, U, EM, BLOCKQUOTE,PREFORMATTED, SUB, SUP, STRIKE) 2.10 Ordered List- OL (LI, Type- 1, I, A, a; START,VALUE) 2.11 Unordered List - UL (Bullet Type- Disc, Circle, Square, DL, DT, DD) 2.12 Marques tags and its properties 2.13 Anchor Tag and its properties <ul style="list-style-type: none"> • Creating Links: Link to other HTML documents or data objects • Links to other places in the same HTML documents • Links to places in other HTML documents • Anchor Tag and Hyperlink <A HREF> and <A NAME>, • Inserting Inline Images <IMG ALIGN, SRC, WIDTH, HEIGHT, ALT, Image Link • Horizontal Rules <HR ALIGN, WIDTH, SIZE, NOSHADE> 			
3	Web Page Authoring Using HTML:	3.1 Tables: Creating Tables, Border, TH, TR, TD, CELSPACING, CELLPADDING, WIDTH, COLSPAN, CAPTION, ALIGN, CENTER 3.2 Frames: Percentage dimensions, Relative dimensions, Frame - Src, Frame border, height and width, Creating two or more rows Frames <FRAMESET ROWS >, Creating two or more Columns Frames <FRAMESET COLS >, <FRAME NAME SRC MARGINHEIGHT MARGINWIDTH SCROLLING AUTO NORESIZE>, <NOFRAMES>, </NOFRAMES>	5		

Units	Topics	Contents	Hours	Methods/ Media	Marks
4	Forms:	4.1 Definition: form tag and attributes 4.2 E-mailed to someone in particular 4.3 Forms involve two-way communication 4.4 Form Tags: FORM, <SELECT NAME, SIZE, MULTIPLE / SINGLE><OPTION></SELECT>, <TEXTAREA NAME ROWS COLS >, </TEXTAREA>, METHOD, CHECKBOX, HIDDEN, IMAGE, RADIO, RESET, SUBMIT, INPUT <VALUE, SRC ,CHECKED, SIZE, MAXLENGTH, ALIGN>	5		
5	HTML5 and Features	5.1 Introduction 5.2 HTML5 New Elements 5.3 Semantics 5.4 Graphics (Canvas, SVG, Google Maps) 5.5 Media (Media, Video and Audio)	5		
6	HTML Editors & Tools:	6.1 Use of different HTML editors and tools like Dreamweaver, Notepad++ Eclipse and NetBeans etc. 6.2 Graphical and Animation Tools: Use of Different graphical and animation tools like Abode Photoshop, MS Paint and Flash etc. 6.3 Adding Sounds and Animation to the web page (using embed tag)	5		
7	Cascading Style sheet:	7.1 Cascading Style Sheets 7.2 Introduction to Cascading Style Sheet (CSS), 7.3 Three ways of introducing the style sheets to your document. 7.4 Basic Syntax; Creating and saving cascading style sheets. <STYLE> tag. 7.5 Examples showing the linking of external style sheet files to a document; Inline and Embed, <DIV> tag; COLOR, BACKGROUND-COLOR, FONT-FAMILY, FONT-STYLE, FONT-SIZE and FONT-VARIANT; FONTWEIGHT, WORD-SPACING, LETTER-SPACING, TEXTDECORATION, VERTICAL-ALIGN,	5		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		<p>TEXT-TRANSFORM; TEXT-ALIGN, TEXT-INDENT, LINEHEIGHT</p> <p>7.6 Introduction to Margin, Padding and Border MARGINS (all values), MARGIN-PROPERTY, PADDING (all values), PADDINGPROPERTY; BORDER (all values), BORDER-PROPERTY, BACKGROUNDIMAGE, BACKGROUNDREPEAT</p> <p>7.7 Additional Features, Grouping Style Sheets, Assigning Classes</p> <p>7.8 Introduction to Layers, <LAYER>, <ILAYER> tag</p>			
8	Java Script and jQuery	<p>8.1 Overview of JavaScript</p> <p>8.2 JavaScript Functions, Events, Image Maps and Animations</p> <p>8.3 JavaScript Objects</p> <p>8.4 Working with Browser Objects</p> <p>8.5 Working with Document Object</p> <p>8.6 Document Object Model</p> <p>8.7 Validation, Errors, Debugging, Exception Handling and Security</p> <p>8.8 Introduction of jQuery</p> <p>8.9 jQuery – Selectors</p> <p>8.10 jQuery – Attributes</p> <p>8.11 jQuery – Traversing</p> <p>8.12 jQuery – CSS</p> <p>8.13 jQuery – DOM</p> <p>8.14 jQuery – Events</p> <p>8.15 jQuery – Effects</p>	5		
Practical:			60		
<p>Perform the following tasks:</p> <ol style="list-style-type: none"> 1. Develop a Web page design project using HTML 4 and HTML 5 applied with given above tags. 2. Create three types of Cascading Style Sheets (CSS) and applied into deigned website. 3. Perform the JavaScript Functions into above designed web site. 4. Usedifferent graphical and animation tools adding the sound and motions. 5. Enlist the component of WWW (Web page, Web site, Homepage, protocols, web servers) 6. Apply jQuery elements into above degined web pages. 					

The Laboratory work includes all the implementation of chapter 2 to chapter 8 and finally a student should develop a Web page design project. The topic could be either initiated by the student or selected from a list provided by the instructor.

Reference books:

- 1 Gopalan, N. P., & Akilandeswari, J. (2014). *Web technology: a developer's perspective* (Second edition). Delhi: PHI Learning Private Limited.
- 2 LEMAY, L. (2016). *MASTERING HTML, CSS & JAVASCRIPT WEB PUBLISHING*.S.I.: BPB PUBLICATIONS.
- 3 Pfaffenberger, "World Wide Web Bible", BPB Publication
- 4 Mccoy, "Mastering Web Design", BPB Publication
- 5 Evans, "10 Minute Guide to HTML", Prentice Hall of India Limited (PHI)
- 6 Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
- 7 C. Xavier, "Web Technology & Design", New Age International Publishers.
- 8 Ann Navarro, "Effective Web Design", BPB publications.
- 9 Raj Kamal, "Internet & Web Design", Tata McGraw Hill
- 10 E Stephen, Will Train, "HTML 4.0", BPB publication
- 11 C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill

Third Semester

Subjects:

1. EG 2101 CT Web Technology and Programming II
2. EG 2104 SH Engineering Mathematics III
3. EG 2105 CT Data Structure & Algorithm
4. EG 2107 CT Database Management System(DBMS)
5. EG 2107 EX Microprocessors
6. EG 2108 EX Electronic Devices & Circuits

Web Technology and Programming II

EG 2101 CT

Year: II
Semester: III

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

This course aims at providing skills to the student to development of modern web application and gain a broad understanding of the Web Technology with database. The course will initiate students to the different web development tools and technology such as Ajax, XML, PHP-MySQL and open sources web development frameworks.

Course Objectives

After completing this course, the students will be able to:

- Explain basics of various Scripting Languages.
- Explain the XML and used into web development.
- Describe the AJAX and implement into webpage design.
- Create interactive web sites and maintain them with server-side scripting.
- Handle the database on the web site using PHP and MySQL

Course Contents

Units	Topics	Contents	Hours	Methods /Media	Marks
1	XML and Ajax	1.1 Introduction to XML 1.2 Working with Basics of XML 1.3 Converting XML Documents in Other Formats 1.4 Working with XSLT 1.5 Working with XPath, XLink and XPointer 1.6 XML Application 1.7 Overview of AJAX 1.8 AJAX components 1.9 Asynchronous Data Transfer with XML Http Request 1.10 Implementing AJAX Frameworks 1.11 Consuming Web Services Using AJAX	[5]		

Units	Topics	Contents	Hours	Methods /Media	Marks
2	Introduction to PHP	2.1 Introduction to PHP Scripting Language 2.2 PHP vs JSP vs ASP server-side programming 2.3 Server-Side Scripting vs Client-Side Scripting 2.4 Installing XAMPP or WAMP or other web server 2.5 Setting server environment 2.6 Configuring and Adjusting setting in PHP.ini and httpd.conf 2.7 Running PHP Scripts 2.8 Formatting Outputs 2.9 Working with Variables, Global Variables and Constants. 2.10 Logical, Concatenation, mathematical and relational operators 2.11 Escape Sequences	(10)		
3	Programming on PHP	3.1 Conditional Statements (If, if else, switch statement) 3.2 Iteration and Looping (do while, while, for loop, foreach loop) 3.3 Functions: Built-In and user-defined functions 3.4 String functions and pattern: String comparison, String concatenation 3.5 Array: Numeric Array, Associative Array 3.6 One Dimension and multi-dimensional array	[10]		
4	Programming on PHP	4.1 Web Concepts in PHP 4.2 Get and Post 4.3 File Inclusion and Files & I/O 4.4 Functions 4.5 Cookies 4.6 Sessions 4.7 Sending Emails 4.8 File Uploading 4.9 Error Handling 4.10 Bugs Debugging	[5]		

Units	Topics	Contents	Hours	Methods /Media	Marks
5	PHP and Database Connection	5.1 BASIC DATABASE CONCEPTS 5.2 Explore PhpMyAdmin panel 5.3 Create MySQL Database Using PHP 5.3.1 Opening Database Connection 5.3.2 PHP.INI file Configuration 5.3.3 Closing Database Connection 5.3.4 Creating a Database 5.3.5 Selecting a Database 5.3.6 Creating Database Tables 5.4 Deleting MySQL Database and Table Using PHP 5.5 Insert Data into MySQL Database 5.6 Retrieve Data From MySQL Database 5.7 Releasing Memory 5.8 Updating Data Into MySQL Database 5.9 Deleting Data From MySQL Database 5.10 Using PHP To Backup My SQL Database	[10]		
6	PHP Framework: LARAVEL	6.1 Overview of Laravel Framework 6.2 MVC Concepts in Laravel 6.3 Installation 6.4 Artisan and Routing 6.5 Controller, View and Migration 6.6 Request and Response 6.7 Seeding 6.8 Database Configuration 6.9 Blade Templating System 6.10 Emailing and Session 6.11 Authentication and Authorization 6.12 Pagination	[5]		
	Practical	Perform the following tasks: 1. Apply XML in web development. 2. Apply AJAX in web development 3. Install and configure Apache, PHP and MySQL 4. Demonstrate the PHP programming 5. Develop web site using PHP and MySQL 6. Apply PHP framework like Laravel to develop the web site.	[45]		

Practical:

Students are given lab assignments to help gain practical experience in both the Server side and client side scripting languages and are given a final project that includes developing a Dynamic web page design including database connectivity. The topic could be either initiated by the student or selected from unit 1-7 provided by the instructor.

Reference Books

1. *Kogent Learning Solutions Inc (2013). HTML 5 Black Book: CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery. Wiley India*
2. *Bayross, I. (2005). Web enabled commercial applications development using ... HTML, DHTML, Javascript, Perl CGI. New Delhi: BPB publication.*
3. *Nixon, R. (2015). Learning PHP, MySQL & JavaScript: with jQuery, CSS & HTML5 (4. ed). Beijing: O'Reilly.*

Reference Materials

1. *Lockhart, J. (2015). Modern PHP (1. ed). Sebastopol, Calif: O'Reilly.*
2. *Bergmann, S., & Pribsch, S. (2011). Real-world solutions for developing high-quality PHP frameworks and applications. Indianapolis, Ind: Wiley.*

Engineering Mathematics III

EG 2104 SH

Year: II
Semester: III

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

Units	Topics	Contents	Hours	Methods/ Media	Marks
Unit 1	Partial Derivative	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, 1.6 Derivative of composite functions.(Total differential coefficient)	[8]		
2	Differential Equations:		[10]		
2.1	Ordinary Differential Equations	<ul style="list-style-type: none"> • Differential Equation and its order and degree. • Differential Equations of first order and first degree, • Differential Equations with separate variables, • Homogeneous and exacted differential Equations 			

Units	Topics	Contents	Hours	Methods/ Media	Marks
2.2	Partial Differential Equations (PDF)	<ul style="list-style-type: none"> • Basic concepts, definition and formation • General solution of linear PDF of first order ($Pp + Qq = R$ form) 			
3	Infinite Series:	<ul style="list-style-type: none"> • Definitions of sequence and infinite series, • Condition for convergence of an infinite series, • Geometric series. • Test of convergence. (p-test, D'alembert's ratio test, Cauchy radical test or root test) • Power series and its interval of convergence, • Expansion of functions using Taylor's and Maclaurin's theorems. 	[11]		
4	Fourier Series:	<ul style="list-style-type: none"> • Periodic function, • Even and odd function • Trigonometric series • Fourier series of the functions of period 2π, • Euler's formula, 	[8]		
5	Elementary Group Theory:	<ul style="list-style-type: none"> • Binary operation, Binary operation on sets and their properties. • Definition of group • Group whose elements are not number • Finite, Infinite group and Abelian group • Elementary properties of group. 	[8]		

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 Structures and Algorithm

EG 2105 CT

Year: II
Semester: III

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Introduction

The purpose of this course is to provide the students with the basic concepts of data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that might occur. This course offers the students a mixture of theoretical knowledge and practical experience. Programming language C can be used for practical work.

Objectives

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

- Introduce data abstraction and data representation in memory
- Discuss, design and use elementary data structures such as stack, queue, linked list, tree and graph.
- Decompose complex programming problems into manageable sub-problems
- Introduce theory of algorithms and their complexity

Course Contents

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Data Structures and Algorithms	1.1 Data Structures: Definition and Types 1.2 Abstract Date Type 1.3 Dynamic Memory: malloc, calloc, realloc and free 1.4 Introduction to Algorithms: Definition and properties of algorithms 1.5 Asymptotic Notations: Big-O, Big-Ω and Big-θ	(5)		
2	Stacks	2.1 Definition, Stack as ADT 2.2 Stack Operations: Concept and Algorithms 2.3 Stack Applications	(5)		
3	Queues	3.1 Definition, Queue as ADT 3.2 Queue Operations: Concept and Algorithms 3.3 Queue Applications 3.4 Linear vs Circular Queue 3.5 Circular Queue Operations: Concept and Algorithms	(6)		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		3.6 Concept of Priority queue.			
4	Recursion	4.1 Definition, Recursion vs Iteration 4.3 Factorial, Fibonacci sequence, and TOH 4.4 Applications and Efficiency of recursion	(4)		
5	Linked lists	5.1 Definition, Linked List as ADT 5.2 Types of Linked List 5.3 Basic operations in Singly Linked List: creation, node insertion and deletion from beginning, end, and specified position 5.4 Linked List Implementation of Stack and Queue 5.5 Concept of other types of Linked Lists 5.6 Applications of Linked List	(8)		
6	Trees	6.1 Concept and Definition: Concept of level, depth, number of nodes 6.2 Binary Tree and Binary Search Tree 6.3 Insertion, Deletion, and Traversal of BST 6.4 Applications of Tree, Concept of Balanced Trees	(5)		
7	Graphs	7.1 Representation and Applications of Graph 7.2 Graph Traversal Algorithms: Depth First Traversal and Breadth First Traversal 7.3 Minimum Spanning Trees: Kruskal's Algorithms	(5)		
8	Sorting and Searching	8.1 Concept of Sorting and Searching 8.2 Comparison Sorting: Bubble, Selection, and Insertion Sort and their complexity	(7)		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		8.3 Divide and Conquer Sorting: Merge, and Quick Sort and their Complexity 8.4 Searching Algorithms: Sequential, and Binary Search 8.5 Concept of Hash Data Structure and Hash Function			
Laboratory Work (45 hrs)			(45 hrs)		
<ul style="list-style-type: none"> – Write program to implement stack operations – Write program to implement linear queue operations – Write program to implement circular queue operations – Write programs to implement recursive algorithms – Write programs to implement linked list operations – Write programs to implement linked stack and linked queue – Write programs to implement Comparison Sorting algorithms – Write programs to implement searching algorithms – Write programs to implement BST operations – Write programs to implement graph operations 					

Recommended Books

1. Y Langsam , MJ , Augenstein and A.M , Tanenbaum (2007) Data Structures using C and C++ , Prentice Hall India, Second Edition

References

1. G.W Rowe (2016), Introduction to Data Structure and Algorithms with C and C++ , prentice Hall India, First Edition
2. G. S. Baluja, (2016), *Data structure Through C, A Practical Approach*, Fourth Edition, DhanpatRai& Co, Second Edition, 2016

Database Management Systems

EG 2107 CT

Year: II
Semester: III

Total: 7 hours/week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

The course covers the fundamental concepts of database and database management system including database design using entity relationship diagram, relational databases, structured query language, normalization, transaction processing, and concurrency control and recovery techniques.

Course Objective:

The main objective of this course is to:

- Explain the concepts of database and database management system.
- Provide knowledge of database design using entity relationship diagram.
- Perform on SQL statements, normalization, transaction processing, and database recovery.

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Database and Database System	<ul style="list-style-type: none"> • Introduction; • Characteristics of the Database Approach; • Advantages of Using the DBMS Approach; • Data Models, • Schemas, and Instances; • Three-Schema Architecture and Data Independence; • Centralized and Client/Server Architectures for DBMSs; • Classification of Database Management Systems 	(6)		
2	Data Modeling Using the Entity-Relational Model	<ul style="list-style-type: none"> • Introduction to Entity-Relationship Model; • Entity Types, • Entity Sets, • Attributes, and Keys; • Relationship Types, • Relationship Sets, • Roles, and Structural Constraints; • Weak Entity Types; • ER Diagrams 	(9)		

Units	Topics	Contents	Hours	Methods/ Media	Marks
3	The Relational Database and SQL	<ul style="list-style-type: none"> • Relational Model Concepts; • Relational Model Constraints and Relational Database Schemas; • Introduction to Relational Algebra; • SQL: • Data Definition and Data Types, • Specifying Constraints, • Basic Retrieval Queries, and INSERT, DELETE and UPDATE Statements 	(10)		
4	Relational Database Design	<ul style="list-style-type: none"> • Relational Database Design Using ER-to- • Relational Mapping; • Functional Dependencies; • First, Second and Third Normal Form; • Properties of Relational Decomposition 	(7)		
5	Transaction Processing, Concurrency Control, and Recovery	<ul style="list-style-type: none"> • Introduction to Transaction Processing; • Transaction and System Concepts; • Desirable Properties of Transactions; • Serializable Schedule; • Two-Phase Locking and Timestamp Ordering Techniques; • Introduction to Database Recovery 	(13)		
	Practical:				
	<ul style="list-style-type: none"> • Write SQL query for CREATE, INSERT, DELETE, and UPDATE operations. • Write SQL query for SELECT operation. • Write SQL query using aggregate functions. • Apply SQL for specifying constraints. 		45hrs		

Recommended Books:

- Ramez Elmasri and Shamkant B. Navathe (2010), Fundamentals of Database Systems, 6th Edition, Pearson Addison Wesley
- Silberschatz, H.F. Korth, and S. Sudarshan (2010), Database System Concepts, 6th Edition, McGraw Hill
- Raghu Ramakrishnan, and Johannes Gehrke (2007), Database Management Systems, 3rd Edition ,McGraw-Hill
- Jaffrey D. Ullman, Jennifer Widom; A First Course in Database Systems; Third Edition; Pearson Education Limited

Microprocessor

EG 2107 EX

Year: II
Semester: III

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 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. Explain the working principle of a computer
2. Demonstrate the working principle of microprocessor
3. Implement the process of writing and executing low level language
4. Explain and implement the Interfacing techniques of devices with a computer system

Course Contents

Units	Topic	Contents	Hours	Methods/ Media	Marks
1	Introduction to Microprocessor:	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 x86 microprocessors 1.7 Block diagram of a typical microprocessor and microcontroller 1.8 Programming language 1.9 Instruction set of microprocessors 1.10 Introduction to Simple as Possible (SAP1, SAP2, SAP3) computers	[8]		
2	Microprocessor architecture and	2.1 Internal architecture of 8085 microprocessor 2.2 Instruction and data formats	[8]		

	the instruction set:	2.3 Instruction classifications 2.4 Addressing modes in 8085 2.5 8085 Instruction set			
3	Assembly language programming for 8085	3.1 Introduction to assembly language and assemblers 3.2 Simple assembly language programs 3.3 Programs using loops, counters, delays 3.4 Table processing 3.5 Subroutine and stack 3.6 Code conversion ASCII/BCD/Binary	[9]		
4	Interfacing I/O and memory devices:	4.1. 8085 machine cycles and bus timing <ul style="list-style-type: none"> • Fetch and execute cycles • Memory read/write machine cycle • I/O read/write machine cycle 4.2. Address Decoding <ul style="list-style-type: none"> • Unique and non-unique address decoding • Address decoding for I/O and memory devices 4.3. Interfacing I/O devices <ul style="list-style-type: none"> • Interfacing Input Devices • Interfacing Output Devices • Address decoding using block decoders • Interfacing Memory-mapped I/O 4.4. Memory Interfacing <ul style="list-style-type: none"> • Memory structure and its requirement • RAM and ROM chips • Address decoding using NAND and block decoders 4.5. Direct memory access	[10]		
5	8085 Interrupt processing:	5.1. Programmed I/O 5.2. Interrupt Driven I/O 5.3. The 8085 Interrupt 5.4. 8085 Vectored Interrupts 5.5. Restart and software instructions	[6]		
6	Introduction to general purpose	6.1. 8255 Programmable Peripheral Interface	[4]		

	programmable peripheral devices:	6.2. 8254(8253) Programmable Interval Timer 6.3. 8259 Programmable Interrupt Controller 6.4. 8251 USART			
Practical:			[45 hrs]		
Perform the following tasks:					
		<ol style="list-style-type: none"> 1. Demonstrate the basics of microcomputer system through the 8085 microprocessor trainer kit 2. Write a program that uses data transfer instructions 3. Write a program that uses arithmetic instructions 4. Write a program that uses logical instructions 5. Demonstrate with conditional and unconditional branching 6. Demonstrate with conditional and unconditional subroutine call and stack 7. Demonstrate involving loops and counters 8. Demonstrate that involves masking and checking numbers 9. Write a program to manipulate table of numbers 10. Write a program for BCD and ASCII manipulation 11. Write a program to perform multiplication and division 12. Write a programs to read and write from the port 			

Reference books:

1. Ramesh S. Gaonkar, “8085 Microprocessor programming and interfacing”, New Age
2. John Uffenbeck, “The 8080, 8085 & Z-80 Programming, Interfacing and Troubleshooting”, PHI
3. B. Ram "Fundamentals of Microprocessor and Microcontrollers" Dhanpat Rai Publications
4. Ajay Wadhwa, "Microprocessor 8085: Architecture, Programming and Interfacing", PHI
5. Albert Paul Malvino, Jerald A. Brown, “Digital Computer Electronics”, McGraw-Hill

Electronic Devices and Circuits

EG 2108 EX

Year: II
Semester: III

Total: 8 hour /week
Lecture: 4 hours/week
Tutorial: 1 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.
- 2 Identify the characteristics of passive and active components.
- 3 Explain the working principles of various semiconductor devices, relate their characteristics and applications
- 4 Explain the characteristics of CB, CE and CC configuration circuits
- 5 Explain the function of different dc power supplies.
- 6 Explain the function of JFET, MOSFET
- 7 Explain the function of SCR, PUT, UJT , special diodes and wave generating circuits

Course Contents:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	History of electronic devices	1.1 Electron vacuum tubes: 1.2 Diode, 1.3 Triode and Pentode:	2 hrs		
2	Basic Passive Devices: R, C and L:	2.1 Construction, 2.2 Types, 2.3 Color coding 2.4 Characteristics	4 hrs		
3	Semiconductor Diodes:	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	10 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		<p>characteristic, principles of operation, and effects of temperature and junction capacitance.</p> <p>3.5 Analysis of PN junction diode circuit: The V-I characteristic and mathematical expressions with equivalent model circuit diagrams.</p> <p>3.6 Operation in the reverse breakdown region- Zener diode, principles of operation and IV characteristic.</p>			
4	Power Supplies:	<p>4.1 Half wave and full wave rectifiers – Types, working principles, characteristics and applications.</p> <p>4.2 Analysis of simple DC voltage power supplies – Principles, characteristics and ripple (voltages) factors.</p> <p>4.3 Simple voltage regulation using Zener diodes – Principles, circuits, characteristics and application.</p>	6 hrs		
5	Bipolar Junction Transistors (npn and pnp) – Types, construction, working principle as an amplifier and characteristics:	<p>5.1 The Unbiased Transistor, The Biased Transistor, Transistor Currents, The CE Connection, The base Curve, Collector Curves, BJT AC Models: Base-Biased Amplifier, Emitter-Biased Amplifier, Small Signal operation, AC Beta, AC Resistance of the Emitter Diode, Reading Data Sheets</p> <p>5.2 Other characteristics of BJT – The load line, operating point, Saturation and cutoff modes: Definition, circuits, principles and characteristics.</p> <p>5.3 CC and CB Amplifier: CC Amplifier, Output Impedance, Cascading CE and CC, Darlington Connections, Voltage Regulation, The Common Base amplifier</p> <p>5.4 Types of amplifier circuits: Class A, Class B, Class AB and Class C –</p>	14hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		<p>Definition, characteristics and applications.</p> <p>5.5 Frequency Effects: Frequency Response of an Amplifier, Decibel Power gain, Decibel voltage gain, Impedance matching,</p>			
6	Field Effect Transistor (JFET and MOSFETS) – Types, construction, working principles as an amplifier and characteristics:	<p>6.1 Basic Ideas, Drain Curves, Transconductance Curves, Biasing in Ohmic Region, Biasing in Active Region,</p> <p>6.2 Saturation, cut off breakdown and ohmic regions of operation – analysis of V-I characteristic curves.</p> <p>6.3 The Depletion Mode MOSFET, D-MOSFET Curves, Depletion Mode MOSFET Amplifier, The Enhancement Mode MOSFET</p> <p>6.4 Data Book</p>	12hrs		
7	Special Semiconductor Devices – Working principles, functional circuits, characteristics and applications:	<p>7.1 UJT, PUT, SCR, Diac and Triac.</p> <p>7.2 Photo voltaic effects and solar cells.</p> <p>7.3 Photodiode, phototransistor, LED, LDR, opt couplers and isolators.</p> <p>7.4 Tunnel diode, Schottky diode, GaAs Transistors, MOSFET.</p> <p>7.5 Charge coupled devices, Hall effects, solid state relay and thermistor.</p> <p>7.6 Multi vibrators: Generation of square and triangular wave forms using 555 IC</p>	12hrs		
Practical:		<p>Demonstrate the following tasks:</p> <ol style="list-style-type: none"> 1 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 	45 hrs		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		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. (2010). *Basic Electronics: Solid state*. New Delhi: S. Chand & Company Ltd.
2. Sharma, S., & Sharma, D. (2010). *Electronic principles*. New Delhi: S.K. Kataria & Sons
3. Floyd, T. L. (2005). *Electronic devices*. Upper Saddle River, N.J: Pearson Education.
4. Malvino, A. P., & Bates, D. J. (2016). *Electronic principles*. New York: McGraw-Hill Education

Fourth Semester

Subjects:

1. EG 2211 CT Data Communication
2. EG 2212 CT System Analysis and Design
3. EG 2213 CT Visual programming
4. EG 2214 CT Computer Architecture
5. EG 2215 CT Computer Repair & Maintenance
6. EG 2216 CT Computer Graphics
7. EG 2207 SH Statistics & Probability

Data Communication

EG 2211 CT

Year: II
Semester: IV

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

This course deals with the introduction to communication system, transmission system and media, concepts of multiplexing and multiple access techniques, principles of pulse code modulation, and different types of switching techniques.

Course Objectives:

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

- 1 Explain general communication system,
- 2 Describe different types of transmission system,
- 3 Explain the multiplexing and multiple access techniques,
- 4 Describe the elements and principles of pulse code modulation,
- 5 Describe different types of switching techniques

Course Contents

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Introduction	1.1 Introduction to communication system 1.2 Generic communication model 1.3 Cellular wireless communication 1.4 Network Topologies 1.5 Public-Switched Telephone Network (PSTN)	(4 hrs)		
2	Data Transmission	2.1 Introduction of transmission of signal 2.2 Analog and Digital data transmission 2.3 Asynchronous and synchronous transmission 2.4 Transmission impairments 2.5 Channel capacity 2.6 Signal encoding and decoding	(6 hrs)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
3	Transmission Media	3.1 Twisted pair, coaxial cable, optical fiber(Guided media) 3.2 Radio transmission, microwave transmission, satellite transmission(Unguided media) 3.3 Comparison of guided and unguided media 3.4 Wireless propagation	(4 hrs)		
4	Multiplexing and Multiple Access Technique	4.1 Multiplexing concept 4.2 Multiplexing types(simplex, half duplex, duplex) 4.3 Time Division Multiplexing(TDM) 4.4 Space Division Multiplexing(SDM) 4.5 Frequency Division Multiplexing(FDM) 4.6 Frequency Division Multiple Access (FDMA) 4.7 Time Division Multiple Access (TDMA) 4.8 Code Division Multiple Access (CDMA)	(10hrs)		
5	Pulse Code Modulation	5.1 Sampling 5.2 Quantization, 5.3 Companding 5.4 Line coding 5.5 PCM generation 5.6 PCM transmission format(T1&E1) 5.7 Line codes (Unipolar, Polar, Bipolar, RZ, NRZ, AMI, HDB3, B8ZS)	(7hrs)		
6	Switching Techniques	6.1 Message switching 6.2 Circuit switching 6.3 Packet switching 6.4 Manual switching 6.5 Electromechanical switching	(10hrs)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		6.6 Electronic switching 6.7 Space division switching 6.8 Time division switching			
7	Field visit and background study	7.1 Visit the site of a national data center 7.2 Perform site visit of satellite communication center 7.3 Visit Communication related company and prepare the REPORT.	(4hrs)		
	<u>Practical</u>				
	1. Demonstrate different types of transmission media 2. Build LAN using star topology 3. Build LAN using bus topology 4. Build LAN using tree topology 5. Configure modem of computer 6. Configure hub /switch 7. Set up serial and parallel communication 8. Set up cables for data communication 9. Set up fiber optic and wireless communication 10. Set up pc-pc communication using LAN		45hrs		

Text Books:

1. Stallings, W. (2004), Data Communication and Computer Networks, Seventh Edition, New Delhi: Prentice-Hall of India Limited
2. Tanenbaum, A. S., & Wetherall, D. (2018). Computer networks.

References Books:

1. B. P Lathi, “Modern digital and analog Communication system” Third edition, Oxford university press
2. S. Haykin, “An introduction to analog and digital communication system” latest edition
3. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, 4th Edition

System Analysis and Design

EG 2212 CT

Year: II
Semester: IV

Total: 5 hours/week
Lecture: 3 hrs/week
Practical: 2 hrs/week

Course Description:

Systems are created to solve problems. One can imagine or think systems approach as an organized way of dealing with specific problem. So, in this real or active world, the System Analysis and design, mainly deals with the software development activities. The students can able to know about the system and design and can provide the full knowledge about the system analysis and design and use of model.

Course Objectives:

After completing this course the student will able to:

1. Define a system
2. Explain the different phase of SDLC and their uses
3. Describe the components of System Analysis and Design
4. Analyze and specify the requirements of a system.
5. Design system components and environments.
6. Build general and detailed models that assist programmers in implementing a system
7. Design a database for storing data and a user interface for data input and output, as well as controls to protect the system and its data.

Course Contents:

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Introduction to System Analysis & Design	1.1 Introduction 1.2 Objectives 1.3 Defining System 1.4 System Life Cycle 1.5 Phase of System Development Life Cycle 1.6 Planning, Analysis, Design, Implementation and Maintenance	6 hours		
2	Development, Management & Supporting Processes	2.1 Development Process 2.1.1 Emergent System Properties 2.1.2 System Engineering 2.2 Management Process 2.3 Supporting Process 2.4 System Structure 2.5 Type of Information System	6 hours		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		2.5.1 Transaction Processing System 2.5.2 Management Information System 2.5.3 Decision Support System			
3	Approaches to System Development and Importance of Metrics Measurement in SDLC in SAD	3.1 Finding the Problems 3.2 Methodology and Models, tools & Techniques 3.3 Software Measurement Process and Examples 3.4 Size Oriented Metrics and Example 3.5 Function Oriented Metrics 3.6 Defect Removal Efficiency (DRE) 3.7 Measurements 3.8 Types of Metrics 3.9 Factors or Indicator Affecting Software Quality	7 hours		
4	Requirement Analysis	4.1 Introduction 4.2 The Important of Communication 4.3 Identifying the Requirement 4.4 Information Collection Methods 4.5 Gathering Information by asking questions 4.5.1 Questionnaires 4.5.2 Electronic Data Gathering 4.6 Gathering Information by Observation 4.7 Gathering Information by Prototyping 4.8 Interviewing and Software Requirement Document	6 hours		
5	Data & System Flow Diagram	5.1 Introduction 5.2 DFD and SFD symbols 5.3 Describing System by DFD 5.4 Logical and Physical DFDS 5.5 Processing Description Method 5.6 Structure English 5.7 Decision Tables	6 hours		
6	Object Modeling and Designing	6.1 Data Dictionary 6.2 E-R Model 6.3 Transforming E-R Diagram into Relations 6.4 Normalizations (1 st , 2 nd and 3 rd Normal Form)	6 hours		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		6.5 Object Modeling 6.5.1 Object Environment 6.5.2 Object Structures 6.6 Modeling behavior in object modeling 6.6.1 Class Object Diagram 6.6.2 Use Case Diagram/sequence Diagram			
7	Quality Assurance	7.1 Introduction 7.2 Implementing Quality Assurance 7.3 Inspections	4 hours		
8	Introduction to Software Engineering	8.1 Introduction 8.2 Software Development Process 8.2.1 Waterfall Model 8.2.2 Evolutionary Model 8.2.3 Spiral Model	4 hours		
9	Practical: Teacher/Instructor should provide at least 3 case study about system.		30hrs		

Text Book/Reference Books

1. System Analysis and Design by Igor Hawryskiewicz
2. Modern System Analysis and Design by Jeffery A. Hoffer, Joey F. George, Joseph S. Valacich
3. Web sites of System Analysis and Design

Visual Programming

EG 2213 CT

Year: II
Semester: IV

Total: 7 hours/week
Lecture: 3 hours/week
Practical: 4 hrs/week

Course Description:

This course aims to guide the students in both the theoretical and practical aspects of visual programming of computer for the solutions of the real-world problems. The course covers the language basics, GUI design, use of different controls, object oriented concept, file handling, database programming, calling windows API etc. using VB.net language.

Objectives

After the completion of this course the students will be enabled to:

Course Objectives:

After the completing course the student 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
4. Explain the working process of visual programs

Course content:

Units	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction:	1.1 Introduction of .net framework and dot net as better programming platform 1.2 Languages: VB.Net, C#.net 1.3 Why to choose dot net framework (dot net vs java) 1.4 The integrated development environment 1.5 The element of user Interface 1.6 Event driven Programming(mouse and keyboard handling) 1.7 Properties, methods and events as common controls 1.8 Developing Application : MDI and SDI	[9]		
2	The Language basics:	2.1 Data types 2.2 Access modifiers (static, public, and private, protected)	[9]		

Units	Topics	Contents	Hours	Methods/ Media	Marks
		2.3 Variables, constant 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 collection (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			
3	The Form and Basic Controls:	3.1 Introduction of the form and Basic controls 3.2 Loading, closing, showing and hiding forms 3.3 Label 3.4 Textbox 3.5 Command button 3.6 Option box/check box/ frame 3.7 List and 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	[10]		
4	Exception handling:	4.1 Handling Exceptions using try and catch 4.2 Raising Exceptions using throw 4.3 Pre-defined Exception classes	[2]		
5	File Handling:	File Handling: 5.1 Using File Stream Class 5.2 File Mode 5.3 File Share 5.4 Opening or Creating Files with File Stream Class 5.5 Reading and Writing Text using Stream Reader and Stream Writer Classes	[5]		

Units	Topics	Contents	Hours	Methods/ Media	Marks
6	Working with database:	6.1 Introduction to database and database management 6.2 System Working with Connection, Command, Data Reader 6.3 Creating tables and field in database 6.4 The data control and data binding it with other controls like: textbox, data grid, list boxes etc. 6.5 Entering, validating and accessing fields in database 6.6 Data access with ADO.net	[10]		

Practical:

[60 Hours]

The lab exercise will cover the language basics, GUI design, use of different controls, object oriented concept , file handling , database programming, calling windows API etc. using VB.net language.

1. Demonstrate VB.net Basic IDE
2. Apply Development using wizards
3. Use Arrays in application
4. Use Subroutine and functions
5. Create and add forms/ menu in application
6. Use basic controls such as text box, command button, combo box, list box, etc. in application.
7. Use file to store and retrieve data for application
8. Use Active X controls such as Tree view, Rich edit, flex Grid, etc. in application
9. Use of DLL
10. Use ADO.net to create database application
11. Use windows API functions in VB 2008 application

References books:

1. Evangelos Petroustos, “Mastering Microsoft Visual Basic 2010”, Wiley India
2. Micheal Halvorson, “Microsoft Visual Basic 2010”, PHI
3. Rod Stephen, “ Visual Basic 2012- Programmer Reference”, Wrox
4. “Steven Holzner”, Visual Basic .Net programming black book”, DreamTech press
5. Kunal Chaudhary, “Mastering Visual Studio 2017”, Packt Publishing

Computer Architecture

EG 2214 CT

Year: II
Semester: IV

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: hours/week
Practical: 3 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 over view 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:

Units	Topics	Contents	Hours	Methods /Media	Marks
1	Basic computer architecture:	1.1 Introduction <ul style="list-style-type: none"> • History of computer architecture • Overview of computer organization • Memory Hierarchy • External Memory • Organization of Hard Disk 1.2 Instruction codes <ul style="list-style-type: none"> • Stored Program Organization • Computer Registers • Common bus system • Computer instruction • Instruction set 1.3 Timing and Control 1.4 Instruction Cycle <ul style="list-style-type: none"> • Fetch and decode 1.5 Type of Instruction <ul style="list-style-type: none"> • Register reference instruction • Memory reference instruction • Input-output and interrupt 	[6]		

2	Micro programmed Control:	2.1 Control Memory 2.2 Address Sequencing <ul style="list-style-type: none"> • Conditional Branching • Mapping of Instruction-Subroutines 2.3 Micro program <ul style="list-style-type: none"> • Microinstruction Format • Symbolic Micro program • Binary Micro program 2.4 Design of control unit <ul style="list-style-type: none"> • Basic requirement of control unit • Structure of control unit • Hardwired control unit • Micro program sequencer 	[7]		
3	Central Processing	3.1 Processor organization <ul style="list-style-type: none"> • Internal structure of CPU 3.2 General Register Organization: <ul style="list-style-type: none"> • Control word. • Stack organization. • Instruction Formats • Addressing Modes 3.3 Data transfer and Manipulation: <ul style="list-style-type: none"> • Data Transfer Instructions • Data Manipulation Instructions • Arithmetic Instructions • Logical and Bit Manipulation Instructions • Shift Instructions. 3.4 Program control: <ul style="list-style-type: none"> • Status bit conditions • Conditional Branch Instructions • Subroutine Call and Return • Program Interrupt • Types of Interrupts. 3.5 Reduced Instruction Set Computer (RISC): <ul style="list-style-type: none"> • CISC Characteristics • RISC Characteristics 	[12]		
4	Computer Arithmetic and Memory	4.1 Addition and Subtraction: <ul style="list-style-type: none"> • Hardware Implementation- • Hardware Algorithm 	[12]		

	Organization:	<ul style="list-style-type: none"> • Addition and Subtraction with Signed-2's Complement 4.2 Multiplication Algorithms: <ul style="list-style-type: none"> • Booth Multiplication Algorithm 4.3 Division Algorithms: <ul style="list-style-type: none"> • Divide Overflow • Hardware Algorithm • Floating Point Arithmetic Operations • Basic Considerations • Register Configuration 4.4 Memory concept <ul style="list-style-type: none"> • Main Memory • Auxiliary Memory 4.5 Associative Memory Hardware Organization <ul style="list-style-type: none"> • Match Logic • Read operation and Write operation • Cache memory • Associative Mapping • Direct Mapping • Set-Associative Mapping • Writing into Cache • Cache Initialization. 4.6 Virtual Memory <ul style="list-style-type: none"> • Address space and Memory space • Address mapping Using Pages • Associative Memory page table • Page Replacement 			
5	Pipeline and Multiprocessors:	<ul style="list-style-type: none"> 5.1 Parallel Processing <ul style="list-style-type: none"> • Pipelining • Arithmetic Pipeline • Instruction Pipeline 5.2 Pipeline Example <ul style="list-style-type: none"> • Four Segment Instruction Pipeline • Data Dependency • Handling of Branch Instructions 5.3 RISC Pipeline <ul style="list-style-type: none"> • Three Segment Instruction • Delayed Load • Delayed branch. 	[8]		

		<p>5.4 Multiprocessors</p> <ul style="list-style-type: none"> • Characteristics of Multiprocessors • Interconnection Structure: Time-Shared Common Bus, Multiport Memory, Crossbar Switch, Multistage Switching Network, and Hypercube interconnection 			
	Practical:	<p><u>Perform the following tasks:</u></p> <ol style="list-style-type: none"> 1. Implement the addition and subtraction algorithms 2. Implement the addressing modes 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 	45hrs		

Text books:

1. Morris Mano. M., Computer System architecture, PHI, Third Edition.

Reference books:

1. Hamacher.V.C.,Vranesic. Z. G and Zaky .S. G, Computer Organisation, McGraw Hill, New York,III Edition,1990.
2. Hayes," Computer System Architecture",Mc Graw Hill,1998.
4. William Stallings, "Computer Organization and Architecture", Pearson, Tenth Edition

Computer Repair and Maintenance

EG 2215 CT

Year : II
Semester : IV

Total: 6 hours / week
Lecture: 3 hours / week
Practical: 3 hours / week

Course Description:

This course deals about fundamental concept, theories and popular principles of repair and Maintenance systems of computer. The major focus is trouble shooting, repairing and maintenance into real-life by utilizing the knowledge and skill of computer hardware and software. This makes the learning-teaching process more interactive, skillful and interesting.

Course Objectives:

At the end of the course student will be able to

1. Explain basic operation, classification and role of the computer
2. Perform the maintenance of computer, its accessories and peripherals
3. Take Care of computer and its accessories

Course Contents:

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Introduction to Computer	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)		
2	Classification of Computer	2.1 Analog, Digital, Hybrid Computer. 2.2 Super, Mainframe, Micro-computer. 2.3 General and Special Purpose Computer.	(1)		
3	Role of Computer:	3.1 Education, 3.2 Health, Industries, 3.3 Transportation, 3.4 Research, 3.5 Business.	(2)		
4	Computer History and Generation				
5	System Case:	5.1 Style and size, 5.2 Form Factors,	(2)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		5.3 Switches, 5.4 LEDs, 5.5 Drive bay.			
6	Power Supply:	6.1 Ratings, 6.2 Working Principle, 6.3 Block Diagram, 6.4 SMPS Concept.	(2)		
7	Mother Board and System Devices:	7.1 Form factor, 7.2 Parts, 7.3 Chipset and controller, 7.4 Buses, 7.5 BIOS.	(2)		
8	Input Devices:	8.1 Keyboard, 8.2 Mouse, 8.3 Light pen, 8.4 other devices.	(1)		
9	Processor:	9.1 Arithmetic Logic Unit (ALU), 9.2 Control Unit, Register, 9.3 Machine Cycle (Instruction cycle and Execution cycle), 9.4 Buses (Data bus, Address Bus, Control Bus).	(5)		
10	Storage Devices	10.1 Primary Storage Devices: <ul style="list-style-type: none"> RAM (Types, Speed, Access and Time, Size, Error Detection and Correction, Logical Memory Layout). 	(12)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		<ul style="list-style-type: none"> • ROM (PROM, EPROM, EEPROM). • Cache Memory, • Flash Memory. 10.2 Secondary Storage Devices: <ul style="list-style-type: none"> • 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). 			
11	Video Display:	11.1 Video modes, 11.2 Resolution, 11.3 Color, 11.4 Size	(2)		
12	Monitors:	12.1 CRT (Simple working Principle), 12.2 LCD.	(4)		
13	Printers:	13.1 Impact, non-impact, 13.2 Static or Laser, 13.3 Non-static or inkjet and bubble jet.	(1)		
14	UPS	14.1 Introduction to UPS	(1)		
15	System Care	15.1 Preventive Maintenance: <ul style="list-style-type: none"> • General system care factors, • Cooling and Ventilation, • Power protection, • Data loss and virus protection). 15.2 Data problem detection: <ul style="list-style-type: none"> • Virus detection and protection, • Background of viruses, 	(9)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		<ul style="list-style-type: none"> • Virus scanning and antivirus software <p>15.3 Backup and Disaster Recovery:</p> <ul style="list-style-type: none"> • Risk of data, • Backup methods devices and media, • Backup scheduling, • Recovery of data. 			
Laboratory Work					
		<p>1. Identification and Selection of Required Tools</p> <p>1.1 Physical Assembly procedure:</p> <ul style="list-style-type: none"> • 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. <p>1.2 Installation of Operating Systems:</p> <ul style="list-style-type: none"> • Management of Hard Disk (Partition and formatting), BIOS setup and installation of Operating system (Windows, Linux, Redhat etc), Installation of Device drivers, Configuration, Installation of Application Programs and antivirus. <p>1.3 Connecting Multiple Computers Together:</p> <ul style="list-style-type: none"> • Construction of UTP cable (Straight through and Cross-cable, Connecting through HUB, Switch or Direct connection, Assigning IP numbers and testing of networking. <p>1.4 Troubleshooting and Repairing Techniques:</p> <ul style="list-style-type: none"> • 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 	(45)		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		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.			

Reference:

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

Computer Graphics

EG 2216 CT

Year: II
Semester: IV

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

Course Description:

This course deals with graphics hardware, two and three dimensional graphics, fundamentals of animation techniques; 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.
- 2 Familiarize with hardware involved in graphics.
- 3 Explain Algorithms to generate two and three-dimensional graphical objects and animations.

Course Contents

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Introduction to computer graphics & graphics systems	1.1 History of Computer Graphics, 1.2 Application of Computer Graphics 1.3 CAD and CAM 1.4 Input hardware- Mouse (Mechanical and Optical), Keyboard, Light pen, Touch panel (Optical, Sonic, and Electrical), Tablets (Electrical, Sonic, Resistive), Scanner 1.5 Output hardware – Monitors, plotters, printers 1.6 Raster and vector display technology – principles and characteristics 1.7 Raster display – Monochromatic and color CRTs	[6]		
2	Two-Dimensional Graphics:	2.1 Line drawing methods – DDA and Bresenham algorithms 2.2 Circle and ellipse drawing algorithms 2.3 Review of matrix operations – addition and multiplication 2.4 Two-dimensional transformations – translation, rotation, scaling and reflection	[7]		
3	Three-dimensional Graphics:	3.1 Projection of 3D objects onto 2D display devices 3.2 Parallel and perspective projection	[10]		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		3.3. 3 D transformations – translation, rotation, scaling, reflection 3.4 Methods of 3D object representation– polygon tables and polygon surfaces 3.5 Introduction to hidden line and surface detection techniques 3.6 Introduction to lighting models 3.7 Introduction to shading models – constant shading, Gouraud shading and Phong shading			
4	Fundamentals of Animation Techniques:	4.1 Animation sequence 4.2 Key-frame and parameterized systems 4.3 Morphing and simulating acceleration	[3]		
5	Introduction to Web Graphics Designs and Graphics Design Packages:	5.1 Introduction to graphics file formats 5.2 Principles of web graphics design – browser safe colors, size, resolution, background, anti-aliasing 5.3 Type, purposes and features of graphics packages 5.4 Examples of graphics packages and libraries	[4]		
Practical:			[45]		
<p>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.</p> <p>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.</p> <p>Some algorithm implementation sessions may include:</p> <ol style="list-style-type: none"> Implementation of DDA and BLA Implementation of circle and ellipse drawing algorithms 2D transformations Projections 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.

Statistics and Probability

EG 2207 SH

Year: II
Semester: IV

Total: 4 hour /week
Lecture: 3 hours/week
Tutorial: 1 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. Explain the principles and concept of probability to simple engineering problems
2. Apply statistics to solve simple engineering problems

Course Contents:

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Introduction:	1.1 Origin and Definition of Statistics 1.2 Importance and Scope of Statistics 1.3 Limitation of statistics	4hrs		
2	Basic concept of Statistical Studies:	2.1 Data, type and Sources of data 2.2 Population and Sample 2.3 Variables and Parameter	6hrs		
3	Organizing a Raw Data:	3.1 Classification of Data 3.2 Meaning and Importance of table 3.3 Parts of Table	6hrs		
4	Pictorial Representation of a Data Set	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	5hrs		
5	Summarizing a Data set:	5.1 Introduction 5.2 Central Tendency (mean, median, and mode)	8hrs		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		5.3 Variability of Dispersion (range, inter quartile range, and standard deviation)			
6	Concepts of Probability:	6.1 Introduction of probability 6.2 Definition of probability 6.3 Basic terms of probability theory 6.4 Counting rule (permutation and combination) 6.5 Additive and multiplicative law of probability	8hrs		
7	Theoretical probability distribution:	7.1 Random variables 7.2 Binomial distribution 7.3 Poisson distribution 7.4 Normal Distribution	4hrs		
8	Bivariate data analysis:	8.1 Introduction 8.2 Correlation (Karl Pearson's Coefficient of Correlation) 8.3 Linear regression	4hrs		

References books:

1. A Text book of Statistics – B.C. Bajracharya
2. Elementary Statistics – H. C. Saxena
3. Statistical Methods – Mrigendralal Singh

Third Year

(Fifth and Sixth Semesters)

Fifth Semester

Subjects:

1	EG 3101 CT	Computer Networks
2	EG 3111 CT	Management Information System (MIS)
3	EG 3112 CT	Applied Telecommunication
4	EG 3113 CT	Distributed Computing
5	EG 3114 CT	Operating System
6	EG 3115 SH	Cyber security and social ethic
7	EG 3116 CT	Elective – I
		(a) Geographical Information System
		(b) Computer Simulation and Modeling
		(c) Java Programming
8	EG 3117 CT	Minor Project

Computer Networks

EG 3101 CT

Year: III
Semester: V

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

Course Description:

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

Course Objectives:

After completing this course the students will be able to:

1. Introduce the architecture of computer network
2. Explain various hardware devices and software used in computer networks
3. Setup small home/office network
4. Make secure computer network

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to computer network:	1.1 Introductory concept of computer network 1.2 Features of computer network 1.3 Classification of computer network 1.4 Introduction of networking 1.5 Concept of internet 1.6 Application and challenging issues of computer network	5hrs		
2	Network architecture:	2.1 Network types:[LAN, MAN, WAN, CAN, SAN, PAN] 2.2 OSI Reference model 2.3 TCP/IP Reference model 2.4 Network protocols, interfaces, services	5hrs		
3	Hardware and Software for Computer Network:	3.1 Concept of hardware and software for networking 3.2 Network devices:[Repeater, Hub, NIC, Bridge, Switch, Router, Gateway]	6hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		3.3 Client- server and peer to peer model 3.4 Connection versus connectionless services			
4	LAN architecture and standards:	4.1 Introduction to LAN standards and architecture 4.2 Media access control 4.3 MAC address 4.4 CSMA/CD 4.5 Token ring, Token bus 4.6 IEEE 802.3, 802.4, 802.5 4.7 Introduction to wireless LAN, Bluetooth, Wi-Fi, Wi-Max	3 hrs		
5	Physical layer and data layer:	5.1 Introduction to physical layer 5.2 line coding formats 5.3 Channel bandwidth 5.4 propagation and transmission time 5.5 Introduction to data link layer and its issues 5.6 Flow and error control issues at data link layer 5.7 Data link layer protocols[HDLC, PPP]	7hrs		
6	Network Layer:	6.1 Internetworking 6.2 Addressing issues,IP address 6.3 Different classes 6.4 Private and Public address 6.5 Subnet mask and Subnetting 6.6 Classless addressing; 6.7 Routing type and its necessity 6.8 Introduction to IPv4, IPv6 and its necessity	7hrs		
7	Transport and Application layer	7.1 Transport layer issues[Congestion control, Flow control, Quality of service] 7.2 Transport layer protocols[TCP, UDP] 7.3 Application layer and its function	7hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		7.4 Electronic mail: SMTP, File transfer: FTP 7.5 protocols [DHCP, DNS, HTTP, WWW]			
8	Computer Network security:	8.1 Security concept [Confidentiality, Integrity and Availability] Digital signature 8.2 Cryptography and key management 8.3 Firewalls 8.4 Virtual private network, 8.5 Wireless security threats and mitigation	5hrs		
9	Case study: Visit related organization visit to study existing network system and prepare a REPORT.				
	Practical:				
	<ol style="list-style-type: none"> 1. Installation of network interface card and various network devices like hub, switch, router etc. 2. To study different types of Network cables and practically implements cross-wired cable and straight through cable using clamping tool. 3. Perform Installation and configuration of workstation PC 4. To setup peer-to-peer networking and verify it 5. To 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. Dynamic routing (e.g. RIP) and default route 8. Configure HTTP, FTP, DHCP server and verify it 9. Configuration of DNS and e-mail server 10. Design of local area network (LAN, MAN, WAN) 		[45]		

References books:

1. "Computer Networks", A. S. Tanenbaum
2. "Data Communications and Networking", Behrouz A. Forouzan
3. "Data communication and computer Network" 'Dr Sanjay Sharma, S. kkataria & sons-latest edition

Management Information System

EG 3111 CT

Year: III
Semester: V

Total: 5 hours
Lecture: 3 hours/week
Practical: 2 hrs/wk

Course Description:

The main aim of this course is to provide an introduction to the management of information systems (MIS). Managing information systems has become a task for all levels of managers and all function areas of the business. This MIS course is designed to familiarize students with the concepts related to the utilization of information technology in business organizations. This course will focus on technical and managerial aspects of information technology adoption in the organization. This course should provide the student with knowledge of the core principles of MIS, focusing on breadth rather than depth of knowledge. In this course has included case studies, group assignments, and related software exercises that will provide an opportunity to apply MIS concepts to real-world applications.

Course Objectives:

After completing this course the student will able to:

1. Explain the significance of information systems in organizations, Strategic management processes and the implications for the management.
2. Describe different types of management information systems.
3. Identify the basic technologies used in the field of Management Information System.
4. Explain the developments of electronic commerce and the role of Internet.
5. Describe the processes of developing and implementing information systems.
6. Familiarize with ethical and social issues related to information system

Course Contents:

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	Foundation of Information System	1.1 Introduction to information system in business 1.2 Fundamentals of information systems 1.3 Solving business problems with information systems 1.4 Types of information systems 1.5 Effectiveness and efficiency criteria in information system	8 hours		
2	An overview of Management Information Systems	2.1 Definition of a management information system 2.2 MIS versus Data processing 2.3 MIS & Decision Support Systems	8 hours		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		2.4 MIS & Information Resources Management 2.5 End user computing 2.6 Concept of an MIS 2.7 Structure of a Management information system			
3	Concepts of planning	3.1 Concept of organizational planning 3.2 The Planning Process 3.3 Computational support for planning 3.4 Business applications of information technology 3.5 Internet & electronic commerce and its applications Enterprise Solutions 3.6 Information System for Business Operations (SDLC) 3.7 Information System for Strategic Advantage 3.8 Decision Support Systems and its benefits and characteristics	8 hours		
4	Managing Information Technology	4.1 Enterprise & global management 4.2 Security & Ethical challenges 4.3 Planning & implementing changes 4.4 Advanced Concepts in Information Systems 4.4.1 Enterprise Resource Planning 4.4.2 Supply Chain Management 4.4.3 Customer Relationship Management and 4.4.4 Procurement Management.	7 hours		
5	MIS in functional areas of business	5.1 Accounting information systems 5.2 Geographical information systems 5.3 Human resource information systems 5.4 Inventory information systems 5.5 Manufacturing information systems 5.6 Marketing information systems 5.7 Quality information systems	8 hours		

Unit	Topics	Contents	Hours	Methods /Media	Marks
6	Knowledge based systems	6.1 Artificial intelligence 6.2 Expert systems 6.3 Neural networks	3 hours		
7	Office information system	7.1 Nature of office 7.2 Types of office information systems 7.3 Client server computing	3 hours		
Case Study: Teacher/ instructor should select at least three case study from the above contents.					

REFERENCE BOOKS:

1. O Brian, "Introduction to Information System", MCGRAW HILL.
2. Murdick, "Information System for Modern Management", PHI.
3. Jawadekar, " Management Information System", TMH.

Applied Telecommunication

EG 3112 CT

Year: III
Semester: V

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

Course Description:

This course covers introduction to basic communication and telephone system, long distance communication, switching system, traffic system, access network & transmission network, similarly, cellular phone system and wireless communication are also included.

Course Objectives:

After completing this course the student will able to:

1. Explain communication and telephone switching system
2. Familiarize with Principle of long distance communication, time and space switch.
3. Explain telephone traffic system, cellular system and wireless communication
4. Explain on Access Network, and Transmission Network
5. Explain on Measuring Instruments & Tools

Course Content:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction	1.1 Definition of telecommunication and its role for the development of nation: 1.2 Basic block diagram of communication system 1.3 Transmission Media 1.4 Types of radio communication system: telephony, broadcasting of audio and visual information, radio navigation, satellite communication 1.5 Switching system: Rotary dial Telephone, Signaling tones, Strowger switching system, Principles of crossbar switching, Crossbar switch configuration, Crossbar exchange organization	7hrs		
2	Principle of long distance communication	2.1 Introduction to individual telephone channel, group, super group, master group, super master group. Signal, Switching: Stored program control, Software architecture Application	8hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<p>software, Centralized SPC and Distributed SPC, Service Networks:</p> <ul style="list-style-type: none"> • Two stage Networks • Three stage Networks • N Stage Networks <p>2.2 Basic time division space switching and Time multiplexed space switching</p> <p>2.3 Basic time division time switching and Time multiplexed time switching</p> <p>2.4 Combination switching</p> <p>2.5 Principle of line of sight communication, radio relay link, frequency distribution, fading effect, noise.</p> <p>2.6 Satellite communication, short wave (HF) communication, sky wave communication, space wave communication, troposphere communication, ionosphere communication, Optical Fiber communication</p>			
3	Telephone Traffic System	<p>3.1 Network traffic load and parameters</p> <p>3.2 Grade of service and blocking probability</p> <ul style="list-style-type: none"> • Blocking models • loss estimation and delay system <p>3.3 Incoming traffic and service time characterization</p> <p>3.4 Subscriber loop systems</p> <ul style="list-style-type: none"> • Switching hierarchy and routing • Transmission plan <p>3.5 Signaling techniques</p> <ul style="list-style-type: none"> • In channel signaling • Common channel signaling. 	7hrs		
4	Cellular Mobile Telephone and Wireless Communication	<p>4.1 Basic cellular system</p> <p>4.2 Mobile radio environment</p> <ul style="list-style-type: none"> • Trunking • Efficiency • Performance criteria <p>4.3 Operation of cellular systems</p>	7hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		4.4 GSM/ LTE/UMTS evolution and architecture, CDMA architecture, WiFi, WiMax 4.5 Radio Low Power Devices			
5	Access network & Transmission Network	5.1 Types of faults, Maintenance of network- Types of maintenance, MCC; FTTH Network- OLT, Level splitter, CPE, Fusion splicing techniques, 5.2 Civil works for access network- Manhole, Handhole, Trenching & Ducting; Types of ducts used in NT network; 5.3 MDF structure 5.4 Safety measures for working in outside plant, First Aid 5.5 Basic transmission network (Backbone, Spur link) 5.6 Basic PDH/ SDH/ SPDH, Microwave Radio/ Antenna 5.7 IP concept for transmission network 5.8 Introduction of IDU/ ODU of PDH/ SPDH equipment 5.9 Features & services of ADSS, OPGW, VSAT 5.10 Recurrent faults in transmission systems- their causes and remedies 5.11 Lightening protection mechanism for transmission equipment 5.12 Earthing and shielding techniques for telecom equipment	9hrs		
6	Measuring Instruments & Tools	6.1 Various types of mechanical tools 6.2 Pliers & wrenches 6.3 Cable cutter 6.4 Winch machine 6.5 Multi-meter, Voltmeter, Ammeter, Wattmeter, VSWR meter, Tong tester, Sequence tester, Frequency meter 6.6 OTDR	7hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		6.7 DSP meter 6.8 GPS			
Practical		1. Study of Basic telephone System 2. Study of Transmission media 3. Study of TDM and FDM 4. Install of lightening protection mechanism & Earthing 5. Handle Measuring Instruments and Tools 6. Study of optical fiber communication 7. Study visit of Telephone Company. 8. Study Visit of Internet Service Provider	45 hrs		

Text books:

1. N.N. Biswas : Principles of Telephony
2. G. Kennedy : Electronic communication
3. Miller : Modern Electronics Communication
4. M.T. Hills : Telecommunication Switching Principles
5. T. Viswanathan : Telecommunication Switching Systems and Networks
7. W.C.Y. Lee : Mobile Cellular Telecommunication

Reference books:

1. J.C. Bellamy, Digital Telephony
2. Stallings, W., Data Communication and Computer Networks, Seventh Edition, New Delhi: Prentice-Hall of India Limited, 2004
3. Behrouz A. Forouzan, Data Communications and Networking
4. John Wiley & Sons Inc, Telecommunication System Engg.
5. A.S Tanenbaum, Computer Networks Prentice Hall

Distributed Computing

EG 3113 CT

Year: III
Semester: V

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

Course Objective:

After completing this course the student will be able to know about the fundamental aspects of parallel and distributed processing, the taxonomies of parallel systems, the performance measures for parallel systems, and fundamental concept of distributed file system.

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Fundamental Concept of Parallel Processing	1.1 Introduction 1.1.1 History of computer 1.1.1 Parallel Computer structure 1.1.2 Motivation of parallelism 1.1.3 Moore's law 1.1.4 Grand challenge problems 1.2 Types of Parallelism 1.3 Instruction and Thread Level Parallelism 1.4 Data and Memory Level Parallelism 1.5 Granularity 1.5.1 Fine-grained parallelism 1.5.2 Coarse-grained parallelism 1.5.3 Medium-grained parallelism 1.6 Performance of Parallel Processor 1.7 Speed up Performance Law 1.7.1 Amdahl's Law 1.7.2 Gustafson's law	10 Hrs		
2	Processor Architecture	2.1 Uniprocessor Architecture 2.2 CISC and RISC Architecture 2.3 Parallel processing mechanism for Uni-processor 2.3.1 Parallelism and Pipelining within CPU 2.4 Multiprocessor and Multicomputer Model	14 Hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.4.1 UMA Model 2.4.2 NUMA Model 2.4.3 COMA Model 2.4.4 NORMA Model 2.5 Flynn's Taxonomy 2.6 Feng's classification 2.7 Distributed Memory Multi-computers 2.8 Shared Memory Multi-processors			
3	Fundamental Concept of Distributed System	3.1 Introduction to Distributed Systems 3.2 Distributed Systems over Centralized Systems 3.3 Client/Server System 3.4 Peer-to-peer System 3.5 Examples of Distributed Systems 3.6 Main Characteristics of Distributed System 3.7 Advantages and Disadvantages of Distributed System 3.8 Design Goals of Distributed System 3.9 Main Problems of Distributed System 3.10 Models of Distributed System 3.11 Resource Sharing and the Web Challenges 3.12 Types of Distributed System: Grid, Cluster, Cloud	12 Hrs		
4	Distributed File System	4.1 Introduction to Distributed File System 4.2 File Service Architecture 4.3 Introduction to Name Service 4.4 Name Services and Domain Name System 4.5 Google File System 4.6 Comparison of Different Distributed File System	6 Hrs		
5	Case Study	5.1 CORBA 5.2 Mach 5.3 JINI	3 Hrs		
6	Practical				

Unit	Topics	Contents	Hours	Methods/ Media	Marks
	Lab 1:	Implementation of Multithreading Concept. sockets and streams			
	Lab 2:	Implementation of client-server systems including networking with			
	Lab 3:	Domain Name System Configuration on Windows/Linux OS			
	Lab 4 and 5:	Simulation of Google File System using Google File-system Simulator			

Reference:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education.
2. A.S. Tanenbaum, M. VanSteen, "Distributed Systems", Pearson Education.
3. W. P. Petersen, P. Arbenz - Introduction to parallel computing_ [a practical guide with examples in C] (2004, Oxford University Press)
4. Hesham El-Rewini, MostafaAbd-El-Barr - Advanced Computer Architecture and Parallel Processing (2005, Wiley-Interscience)
5. A. Grama, A. Gupta, G. Karypis and V. Kumar. Introduction to Parallel Computing (2nd edition), Addison Wesley (2002).

Operating Systems

EG 3114 CT

Year : III
Semester : V

Total: 6 hours / week
Lecture: 3 hours / week
Practical: 3 hours / week

Course Description:

This course demonstrates the basic features of Operating System and its components. It covers the description and implementation techniques of basic functions of operating system like process management, memory management, file management and device management.

Course Objectives:

At the end of this course, the students will be able to:

1. Define operating system.
2. Explain the history and functions of operating system.
3. Describe need and role of operating system.
4. Describe operating system as resource manager and virtual machine.
5. Explain the memory management techniques.
6. Explain the file management techniques.
7. Analyze and compare different scheduling algorithms used by OS.

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Operating Systems	1.1 Introduction: Definition, Functions 1.2 OS as resource manager, OS as an extended machine 1.3 History of OS, Types of OS 1.4 Introduction to System Call, The Shell, Open source systems	6 Hrs		
2	Process Management	2.1 Definition of Process, Process Vs Program, Process Model, Process states and transitions, PCB (Process Control Block), Thread Vs Process 2.2 Inter Process Communication, Race Condition, Critical Section, Mutual Exclusion with Busy Waiting (Lock Variables,	16 Hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<p>Peterson’s Solution), Sleep and Wakeup, Semaphore</p> <p>2.3 Process Scheduling, Process Scheduling Goals, Batch System Scheduling (First Come First Served, Shortest Job First), Interactive System Scheduling (Round Robin Scheduling) , Introduction to scheduling in RTS</p> <p>2.4 Deadlocks- Introduction, Resource, Pre-emptable and Non-pre-emptable Resources, Deadlock Modeling, Conditions for deadlock, Deadlock Handling strategies (Ostrich Algorithm, Recovering from Deadlock, Prevention from Deadlock)</p> <ul style="list-style-type: none"> • deadlock modeling, deadlock avoidance • deadlock detection and recovery 			
3	Memory Management	<p>3.1 Introduction:Memory Manager, Memory Hierarchy</p> <p>3.2 Memory Management in Monoprogramming, Memory Management in Multiprogramming (Multiprogramming with Fixed Partition and Multiprogramming with Variable Partition), relocation and protection, Coalescing and Compaction</p> <p>3.3 Virtual Memory: Introduction, Paging, Page tables, Page Fault</p> <p>3.4 Page Replacement algorithms: Optimal Page Replacement</p>	10 Hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<p>algorithm, Not Recently Used Page Replacement algorithm, First-In-First-Out algorithm, Clock Page Replacement algorithm</p> <p>3.5 Segmentation, Importance of segmentation, Drawbacks of Segmentation.</p>			
4	File Management	<p>4.1 File Overview : File System, File System Layout, File naming, File Structure, File Types, File Access, File Attributes, File Operations</p> <p>4.2 Directory- Introduction, Directory Systems (Single level, Two level and Hierarchical directory system)</p> <p>4.3 File System Implementation: Contiguous Allocation, Linked List Allocation (using FAT)</p>	6 Hrs		
5	I/O Management	<p>5.1 Classification of IO devices, Controllers, Memory Mapped IO vs IO mapped IO, Interrupt IO vs Polled IO, DMA</p> <p>5.2 Goals of IO software, Handling IO (Programmed IO, Interrupt Driven IO, IO using DMA), IO Software Layers (Interrupt Handlers, Device Drivers)</p> <p>5.3 Disk Structure, Disk Scheduling (FCFS, SSTF, SCAN)</p>	7 Hrs		
6	Practical:	<p>Perform the following tasks:</p> <ol style="list-style-type: none"> 1. Install windows or Linux or Ubuntu. 2. Use basic commands (mkdir, touch, ls, pwd, cd, chmod, df, du, dd, adduser, sort, passwd) 3. Use Vi editor 	45 Hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		4. Configure and administer basic system 5. Explain file and directories (file structure and hierarchy, file permission) 6. Install software (RPM) 7. Manage users 8. Set up Samba, Apache, FTP, DNS, OpenSSH 9. Make programs for scheduling algorithms 10. Make program for Bankers algorithm			

Reference Books:

1. *Silberschatz, A., Galvin, P.B., Gagne G.*, Operating Systems Concepts, John Wiley & Sons (ASIA), Seventh Edition, 2005
2. *Andrew S. Tanenbaum*, Modern Operating Systems, PHI Publication, Third edition, 2008
3. *Sobell, M.G*, "A Practical Guide to Linux", PHI , Fourth edition

Cyber Security and Professional Ethics

EG 3115 CT

Year: III
Semester: V

Total: 2 hour /week
Lecture: 2 hours/week
Practical: 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 skill to the students to how information can be protected throughout application, organization and computer networks and understanding of the social and professional cultural, social, legal, and ethical issues as well. The student will be discussion 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:

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

- Identify the type's cyber threats and issues in computer application, organization and networks.
- Familiarize 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.
- Identify 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	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Cyber Security:	1.1 Concept of Cyber Security 1.2 Cyber Crimes 1.3 Types of Attacks in cyber 1.4 Hacker Techniques	3hrs		
2	Security Technologies:	2.1 Firewalls 2.2 Virtual Private Networks 2.3 Encryption 2.4 Intrusion Detection	5hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.5 Anti-Malicious Software 2.6 Secure Software & Browser Security 2.7 SSL and IPsec			
3	Information Security and Cryptography:	3.1 Classical Encryption Methods 3.2 Asymmetric Key Cryptography 3.3 Confidentiality, Integrity, Authentication and Non-Repudiation 3.4 Digital Signature	4hrs		
4	Legal Issues in Cyber Crime:	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	5hrs		
5	Forensics and Incident Analysis	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	5hrs		
6	Ethics in Cyber security & Cyber Law	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	3hrs		
7	Professional and Ethical Responsibilities:	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	3hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		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			
8	Risks and Liabilities of Computer-Based Systems:	8.1 Software risks 8.2 Safety and the engineers 8.3 Implications of software complexity 8.4 Risk assessment and management	2hrs		

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. NIIT (Organization). (2003). *Ethics and security management on the Web*. New Delhi: Prentice-Hall of India.
4. Social, Legal and Ethical Issues for Computers and the Internet by Sara Baase.
5. Ethics of Computing: Codes, spaces for discussion and law by Jacques Berleur and Klaus Brunnstein Chapman & Hall.
6. Joseph Migga Kizza, Ethical and Social Issues in the Information Age

Geographical Information System

EG 3116 CT (Elective)

Year: III
Semester: V

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

Course Description:

The course deals with concepts and scope of geographic information systems (GIS) and their use for data capture techniques, creating, processing, analyzing and visualizing geographic databases. It is designed to provide students in both the theoretical and practical aspects of GIS to solve real-world problems.

Course Objectives:

After completing this course the student will able to:

1. Explain GIS, background, historical development, components and applications of GIS
2. Explain data capturing for GIS techniques and data creation, digitization, geo-referencing and data management
3. Design data structures and formats,
4. Analyze of various spatial and non-spatial data in GIS
5. Describe the map projection and co-ordinate systems
6. Explore Triangular Irregular Networks (TIN), Digital Elevation Model and visualize map output
7. Explain Global Positioning System (GPS) and Remote Sensing (RS)
8. Explore various open GIS programs.

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Geographical Information System (GIS):	1.1 Definition, components of GIS and objectives of GIS 1.2 History of GIS and significant events in GIS and geospatial technology 1.3 GIS applications 1.4 Basic concept of spatial information 1.5 Introduction of open concept in GIS, open source software for GIS analysis 1.6 Web based GIS system	[10]		
2	GIS Data System:	2.1 Database Management System (DBMS) 2.2 Spatial and non-spatial data, type of data structure 2.3 Raster and Vector formats	[12]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.4 Advantages and disadvantages of various data structures 2.5 Data input techniques 2.6 Geo-referencing, digitization and scanning methods 2.7 Scale and resolution			
3	Map Projection and Coordinate System:	3.1 Concept of longitude, latitude and coordinate system grids 3.2 Coordinate systems 3.3 Ellipsoids and datum 3.4 Map projections and projection parameters	[8]		
4	Spatial Analysis and Visualization:	4.1 Handling spatial and non-spatial data 4.2 Analysis, querying and mapping of spatial database 4.3 Map overlay concepts and overlay analysis 4.5 Spatial data analysis with python 4.6 Vector overlay operations and buffering 4.7 Use of open street map in vector format 4.8 Raster overlay operations and map algebra functions 4.9 Spatial data conversions 4.10 Map layout and basic elements	[12]		
5	Introduction of Global Positioning System (GPS) and Remote Sensing	5.1 Basic Principle of GPS and GPS Segments 5.2 Handling GPS Receiver and Applications in GIS mapping 5.3 Concept of Remote Sensing 5.4 Application of Remote Sensing in GIS mapping	[6]		
6	Surface Analysis and 3D Visualization	6.1 Introduction and need of Triangular Irregular Networks (TIN) and Digital Elevation Model (DEM)	[12]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		6.2 Production of TIN and DEM and DTM 6.3 Data sources and products of TIN and DEM 6.4 Methods of GIS and spatial interpolation techniques 6.5 Basic concepts of image analysis, Digital Terrain Modeling and 3D visualization			
	Practical:	Implement the following :	[45 hrs]		
	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:	Import different formats of data into a GIS from: GPS, hard-copy maps, digital imagery, shapefiles and XY coordinates,			
	Lab#9:	Spatial and 3D analysis: creating TIN and DEM, interpolation, contour, slope			
	Lab#10:	Raster overlay analysis: map algebra, reclassify, convert vector to raster, raster to vector, raster to ASCII			
	Lab#11:	Integrating non-spatial data (census data) with base map, analyzing data, mapping and visualization			
	Lab#12:	Writing, and running geo-processing scripts using Python and other programming languages			
	Lab#13:	Handling Global Positioning System (GPS) receiver, tracking and locating waypoints, add GPS data to Arc Map and Google Earth for analyzing and visualization			
	Lab#14:	Retrieving, analyzing and visualizing Open Street Map data using QGIS/ArcGIS			
	Lab#15:	Installation of QGIS, QGIS interface, adding different formats of data, analysis and visualization using QGIS			

Text books:

1. Chang, K-T. (2015). Introduction to Geographic Information Systems, 8th Edition, McGraw Hill.
2. Chestern, "Geo Informational Systems - Application of GIS and Related Spatial Information Technologies", ASTER Publication Co., 1992

References books:

1. Jeffrey Star and John Estes, "Geographical Information System - An Introduction", Prentice Hall, 1990
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. Tempfli, Klaus, Kerle, Norman, Huurneman, Gerrit and Janssen, L.F. (2009). Principle of Remote Sensing: An Introductory Textbook, International Institute of Geo-information Science and Earth Observation, The Netherlands.
4. Longley, P.A., Goodchild, M., Maguire, D.J., Rhind, D.W. (2015). Geographical information systems and science. 4th ed. John Wiley & Sons.
5. Neteler, M. (2008). Open source GIS: a GRASS GIS approach. Springer Science+Business Media, New York.
6. Anji Reddy M. (2008). Remote sensing & GIS. 3rd Edition, BS Publications, 2008.
7. Burrough,P.A., "Principles of GIS for Land Resources Assessment", Oxford Publication, 1980.

Computer Simulation and Modeling

EG 3116 CT (Elective)

Year: III
Semester: V

Total: 7 hours /week
Lecture: 4 hours/week
Practical: 3 hours/week

Course Description:

After completing this course the student will be able to know about Simulation, Analog methods for Simulation, Queuing system, Random Number and Different types of Simulation Software.

Course Objectives:

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

1. Define Simulation and Modeling
2. Explain queuing systems.
3. Identify the areas of application of Simulation and Modeling.
4. Describe the properties of Random Numbers.
5. Analysis of simulation output

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Simulation and Modeling	1.1 Definition of Simulation and Modeling 1.2 System and System Environment 1.3 Component of System 1.4 When simulation is the appropriate tool and when it is not appropriate Advantages and disadvantages of Simulation 1.5 Areas of application 1.6 Stochastic and Deterministic Activity 1.7 Discrete and Continuous system 1.8 System Modeling 1.9 Types of Model 1.9.1 Static physical model 1.9.2 Static mathematical model 1.9.3 Dynamic physical model 1.9.4 Dynamic mathematical model 1.10 Distributed Lag model 1.11 Steps in simulation study 1.12 System Studies 1.12.1 A Corporate Model 1.12.2 Management Segment 1.12.3 Environment Segment 1.13 Law	[15 Hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		1.13.1 Amdahl's Law 1.13.2 Gustafson's law			
2	Continuous System Simulation	2.1 Differential equations 2.2 Analog and Digital Computer 2.3 Hybrid Computer 2.4 Analog Method 2.4.1 Analog Method for Automobile Suspension Problem 2.4.2 Analog method for solving the model of Liver 2.5 Digital Analog Simulator 2.6 Hybrid Simulation 2.7 Real Time Simulation	[9 Hrs]		
3	Queuing System	3.1 Queuing Model 3.2 Characteristics of queuing systems 3.2.1 Calling Population 3.2.2 System Capacity 3.2.3 The Arrival Process 3.2.4 Queue Behavior and Queue Discipline 3.2.5 Service Time and Service Mechanism 3.3 Application of Queue 3.4 Queuing Notation 3.5 Type of Queuing System 3.5.1 Single Waiting Line Single Server Queue 3.5.2 Single Waiting Line Multiple Server Queues 3.5.3 Multiple Waiting Lines Multiple Server Queues 3.6 Performance of M/M/1 System 3.6.1 Server Utilization ratio 3.6.2 Server idle ratio 3.6.3 Average number of customer in the system 3.6.4 Average number of customer in the queue 3.6.5 Average time a customer spends in the system	[9 Hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		3.6.6 Average time a customer spends in the queue			
4	Random Numbers	4.1 Properties of Random Numbers 4.2 Generation of Pseudo-Random numbers 4.2.1 Problems in generation of Random Numbers 4.2.2 Important consideration to generate Random Numbers 4.3 Techniques for generating Random Numbers 4.3.1 Linear Congruential Methods 4.4 Test of Random Numbers 4.4.1 Frequency test 4.4.2 Chi-Square Test 4.4.3 Poker Test ○ Three Digit Poker Test ○ Four Digit Poker Test	[9 hrs]		
5	Analysis of simulation output	5.1 Nature of Problem 5.2 Estimation Method 5.3 Simulation Run Statistics 5.4 Replication of Runs • Mean waiting time • Mean inter-arrival time 5.5 Estimation of Initial Bias	[9 hrs]		
6	Simulation Software	6.1 Introduction to Simulation Software 6.2 Selection of Simulation Software 6.2.1 Model Building Features 6.2.2 Runtime Environment 6.2.3 Animation of Layout Features 6.2.4 Output Features 6.2.5 Vendor Support and Product Documentation 6.3 Simulation in GPSS 6.3.1 GPSS Block- Diagram Symbols	[9 hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		6.3.2 GPSS Block- Diagrams for Single Server Queue 6.3.3 Simulation of Manufacturing Shop 6.4 Simulation of Supermarket			
Practical:			45 hrs		
Perform the following tasks: <ol style="list-style-type: none"> 1) Perform Simulation of Continuous System: Chemical Reactions at equilibrium condition 2) Perform Simulation of the Queuing System. 3) Perform Generation of Random number. 4) Conduct Testing of Random Numbers - Frequency test and Poker Test. 5) Perform Simulation of National econometric system. 					

References books:

1. Geoffrey Gorden, "System Simulation" , Second Edition, Prentice Hall India
2. Jerry Banks, John S, Barry L, David M, "Discrete-Event System Simulation" Fourth Edition, Prentice Hall India

Java Programming

EG 3116 CT (Elective)

Year: III
Semester: V

Total: 7 hours /week
Lecture: 4 hours/week
Practical: 3 hours/week

Course Description:

This course covers different concepts of computer programming using Java programming language. The course covers ideas of programming including comments, data type, operators, variables, constants, control statements, arrays, classes and objects, inheritance and interfaces, packages, exception handling, and input/output.

Course Objective:

The main objective of this course is to

- Introduce Java programming environment
- Explain programming elements using Java
- Describe object-oriented programming concepts, interfaces, and packages
- Handle exception and input/output

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Java	1.1. Java As a Programming Platform 1.2. The Java “White Paper” Buzzwords 1.3. A Short History of Java 1.4. Writing Simple Java Programs	(7 hrs.)		
2	Fundamental Programming Structures	2.1. Writing Comments 2.2. Basic Data Types 2.3. Variables and Constants 2.4. Operators 2.5. Type Casting 2.6. Control Flow 2.7. Arrays	(15 hrs.)		
3	Objects and Classes	3.1. An Introduction to Object-Oriented Programming 3.2. Using Predefined Classes 3.3. Defining Your Own Class 3.4. Static Fields and Methods 3.5. Method Parameters 3.6. Object Construction 3.7. Packages	(15 hrs.)		
4	Inheritance and Interfaces	4.1. Classes, Super classes, and Subclasses 4.2. Polymorphism 4.3. Dynamic Binding 4.4. Final Classes and Methods 4.5. Abstract Classes	(12 hrs.)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		4.6. Access Specifiers 4.7. Interfaces			
5	Exception Handling	5.1. Dealing With Errors 5.2. Catching Exceptions 5.3. try, catch, throw, throws, and finally	(7 hrs.)		
6	Input/output	6.1. Input/output Basics 6.2. Console Input and Output 6.3. Reading and Writing Files	(4 hrs.)		
7	Laboratory Work:	7.1 Write simple programs 7.2 Write programs using different operators, comments and data types. 7.3 Write programs using control statements and arrays 7.4 Write programs using concepts of classes, inheritance, interface, and packages. 7.5 Write programs using file handling, input/output, and exceptions	45 hrs		

Recommended Books:

- a. Core java Volume I – Fundamentals, Ninth Edition, Cary S. Horstmann and Gary Cornell
- b. Java: The Complete Reference, Ninth Edition, Herbert Schildt
- c. Effective Java, Third Edition, Joshua Bloch
- d. Head First Java, 2nd Edition, Kathy Sierra and Bert Bates

Minor Project

EG 3117 CT

Year: III
Semester: V

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

Course description:

This course is designed to meet the requirement of Diploma Level studies under CTEVT program.

Course Objectives:

After completing this course the students will be able to:

1. provide the knowledge of Visual Programming carrying out a project during the project students learn visual programming tool
2. provide the knowledge on planning, design, development and implementation of project
3. provide the knowledge to formulate project documentation and oral presentation for his/her final year project

Course Contents:

30 hrs

Minor Project:

- Preliminary selection of topic
- Discussion with department regarding the practicality of the project (e.g. cost, usefulness, market)
- Finalization of topic
- Submission of the detail proposal (Extensive literature review including survey)
- Start of minor project work in laboratory /home
- Monitoring of the work progress by supervisors and report to department
- A Midterm progress report should be submitted by the Student on the date fixed by department
- Presentation of minor project along with final report (this presentation will be used as an internal assessment by department)
- Final presentation of Minor Project Should Conduct by Examination Center in the presence of external examiners

The Minor Project Document shall include the following items

- Project team members
- Project Supervisors
- 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

Sixth Semester

Subjects:

1. EG 3201 CT Multimedia Technology
2. EG 3211 CT Internet Technology
3. EG 3212 CT Data Mining
4. EG 3213 CT Software Engineering
5. EG 3214 CT Elective – II
 - (e) E- Governance
 - (f) E-commerce
 - (g) Embedded System
6. EG 3215 CT Major Project

Multimedia Technology

EG 3201 CT

Year: III
Semester: VI

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

This course covers different domains of Multimedia Systems like Devices, Systems and its applications and Multimedia tools.

Course Objectives:

After completing this course the students will be enabled to:

1. Explain basics of Multimedia system
2. Find out hardware and software requirements.
3. Operate text, audio/sound, images and graphics, video and animation.
4. Apply communication in multimedia
5. Apply compression techniques.
6. Handle multimedia Tools- Flash and Photoshop

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Multimedia: An Overview	1.1. Multimedia: Definition 1.2. Functions of Multimedia 1.3. Multimedia Components 1.3.1 Text 1.3.2 Graphic 1.3.3 Audio 1.3.4 Video 1.3.5 Animation 1.4. Multimedia Applications 1.4.1 Education 1.4.2 Business and Advertisement 1.4.3 Entertainment	[4 hrs]		
2	Multimedia Hardware and Software	2.1. Analog and Digital Data 2.2. Hardware Requirements 2.2.1. Processing Unit 2.2.2. Memory 2.2.3. Universal Serial Bus (USB) Device 2.2.4. Graphics Card and Graphical Processing Unit (GPU) 2.2.5. Hard Drive 2.2.6. Monitor	[4 hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.2.7. External Storage and Optical Device 2.3. Multimedia Software 2.3.1. Graphic and Image Editing 2.3.2. Audio and Sound Editing 2.3.3. Video Editing 2.3.4. Animation			
3	Text	3.1 Textual Communications 3.2 Font and Typeface 3.3 Text Design Guidelines 3.4 Text Editing Software 3.5 Hypertext and Hypermedia	3hrs		
4	Images and Graphics:	4.1. Importance of Graphics 4.2. Bitmap vs. Vector 4.3. Computer Color Representation 4.4. Image and graphics Format 4.5. Graphics Editing Software	4hrs		
5	Sound / Audio System:	5.1 Concept of Audio 5.2. Audio Digitization 5.3. Audio File Format 5.4. Audio Software and Production	4hrs		
6	Video and Animation:	6.1. Video 6.1.1. Broadcast Video Standards 6.1.2. Digital Video Format and Technology 6.2. Animation 6.2.1. Principles of Animation 6.2.2. History of Animation 6.2.3. Cell Animation, Key frames, and Twinning 6.2.4. Morphing and Inverse Kinematics 6.2.5. Animation Software 6.2.6. Application of Animation 6.2.7. Web-Based Animation 6.2.8. Animation for Learning 6.2.9 . Animation Design and Usage Guidelines	5hrs		
7	Multimedia Project Development:	7.1. Conceptual Plan 7.2. Designing and Producing 7.3. Costing 7.4. Software Testing 7.4.1. Alpha, Beta and Gamma Testing 7.5. System Testing 7.5.1. Regression Testing	6hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
8	Multimedia Communication and Compression:	8.1. Multimedia Communication 8.1.1 Multimedia Communication Basics 8.1.2 Multimedia Network 8.1.3 Communications Standards 8.2. Multimedia Compression 8.2.1 Need of Multimedia Compression 8.2.2 Lossy and Lossless Compression 8.2.3 Image and Video Compression	5hrs		
9	Multimedia application tools	9.1. Introduction to Flash 9.2. Introduction to Photoshop	10hrs		
	Practical:	Photoshop: 1. Apply Photoshop Interface and Various Tools. 2. Create a Photoshop design based on Resolution and sizes 3. Create a Photoshop design with Multiple Layers. 4. Create a Design in Photoshop with mixed contents from multiple images. 5. Create a design in Photoshop and Change the actual colors. Flash: 6. Create scene with a cartoon drawing. 7. Demonstrate use of frame by frame Animation. 8. Demonstrate use of symbols. 9. Draw a house with a pencil. 10. Demonstrate use of layers. 11. Create an e-Card of Birthday wishes	45 hrs		

Reference 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. Macromedia Flash 8: A Tutorial Guide, Jay Armstrong, Jen deHaan, BPB Publisher.
5. Photoshop CS4 in Simple Steps, Kogent Learning Solutions Inc., DreamTech Press

Internet Technology

EG 3211 CT

Year: III
Semester: VI

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

The course is design to impart the practical knowledge and skills to design and setup Internet and Intranet. The focus of this courseis on the practical application of internetworking technologies to private Intranets for Information management and public Internets for electronic commerce. Students will learn theoretical and practical details. Students will develop various Intranet and Internet applications and setup servers as part of practical sessions.

Course Objectives:

After completing this course the student will able to:

1. Describe the basic principles of Internet, Intranet and Extranet
2. Explain the overview of internet protocol layer
3. Describe the hypertext transfer protocols and web services
4. Perform the routing protocol and algorithm in the internet
5. Describe the mechanism of intranet system development
6. Configure Security in internet.
7. Describe the application of multimedia in internet and intranet

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Internet	1.1 Introduction 1.2 History of Internet 1.3 The Network Edge 1.4 End Systems, Clients and Servers 1.5 The Network Core: Optical fiber, Marine cables, Teleports, Satellite and Terrestrial links 1.6 Internet Access overview <ul style="list-style-type: none">• Residential Access• Company Access• Mobile Access 1.7 ISPs and Internet Backbones <ul style="list-style-type: none">• Tier 1 ISPs• Tier 2 ISPs• Tier 3 ISPs	6hrs		
2	Internet Protocol:	2.1 TCP/IP and IP layer overview 2.2 IPV4 and IPV6 address types and formats 2.3 IPV4 and IPV6 Header Structure 2.4 Domain Name System(DNS) 2.5 File transfer protocol (FTP)	10hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.6 Simple mail transfer protocol (SMTP): POP and IMAP 2.7 Internet Request for Comments (RFCs)			
3	HTTP and the Web Services:	3.1 HTTP vs HTTPS, web servers and web Access 3.2 HTTP message format 3.3 Web caching 3.4 Cookies 3.5 Universal naming with URLs 3.6 Web Searching <ul style="list-style-type: none"> • Web directory • Search engine • Meta-search engine 	6hrs		
4	Routing in Internet:	4.1 Introduction of routing protocol <ul style="list-style-type: none"> • Routing Information Protocol (RIP) • Open Shortest Path First (OSPF) • Border Gateway Protocol (BGP) 4.2 Routing Algorithms <ul style="list-style-type: none"> • The Link-State(LS) Routing Algorithm • The Distance-Vector(DV) Routing Algorithm 	[8 hrs]		
5	Intranet system development:	5.1 Introduction of Intranet and Extranet 5.2 Advantages and Disadvantages of Intranets 5.3 Protocols, Structure and Scope of networks 5.4 Intranet Resource: Clients and Server Resources 5.5 Intranet implementation guidelines 5.6 Tunneling protocols: VPN	[6 hrs]		
6	Internet Security:	6.1 Internet Protocol security 6.2 Application and Network layer security 6.3 Access Control: Firewalls <ul style="list-style-type: none"> • Packet filtering firewalls and • Application level gateways 	[4 hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
7	Internet and Intranet Applications:	7.1 Multimedia and Digital video/ audio broadcasting: video/ audio conferencing, Internet Relay Chat(IRC) 7.2 Broadband communications, xDSL and cable internet 7.3 Datacenters and Data warehousing 7.4 Unified Message Systems 7.5 Concept of cloud computing	[5 hrs]		
8	Practical:	1. Install of Network Operating Systems (Windows Server). 2. Assign class of IP address to end user devices 3. Subnetting IP. 4. Network Command and their uses. 5. Client/Server Architecture <ul style="list-style-type: none"> • Install Server • Install Active Directory • Create users • Assign Rights and permission • Configure Clients • Perform File and Printer sharing (with Security Implementation) • Assign the right to each resource. • Perform Remote Access 6. Perform Routing Configuration 7. Configure DNS 8. Configure HTTP, FTP 9. Firewall configuration and management	45 hrs		

References books:

1. Computer Networks; Andrew S. Tanenbaum, James F. Kurose, Keith W. Ross
2. Internet and Intranet Engineering Daniel Minoli, Prentice Hall India limited, New Delhi.

Data Mining

EG 3212 CT

Year: III
Semester: VI

Total: 7 hour/week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Introduction

Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. The course will cover all these issues and will illustrate the whole process by examples.

Objectives

The general objectives of this course are as follows:

- To introduce concept of data preprocessing and data mining
- To discuss multi-dimensional data representation and OLAP operations
- To provide skill of illustrating clustering, classification, and association rule mining algorithms
- To introduce advanced concept of data mining

Course Contents

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to Data Mining	1.1 Data Mining Concepts, KDD vs Data Mining, Data Mining System Architecture 1.2 Data Mining Functionalities, Kinds of Data on which Data Mining is Performed 1.3 Applications of Data Mining,	(5Hrs)		
2	Data Warehouse and OLAP	2.1 Data Warehouse definition and Characteristics, DBMS vs Data Warehouse, Multi-dimensional Data, Data Cube, Cube Materialization 2.2 Data Warehouse Schemas: Star, Snowflake and Fact Constellation Schema 2.3 OLAP Operations: Roll-up, Drill, Down, Slice & Dice, and Pivot Operations	(6Hrs)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.4 OLAP Servers: ROLAP, MOLAP, HOLAP, Data Warehouse Architecture			
3	Data Preprocessing and DMQL	3.1 Data Pre-processing Concepts 3.2 Data Cleaning, Data Integration, Data Transformation, Data Reduction 3.3 Data Discretization and Concept Hierarchy Generation 3.4 DMQL, Syntax of DMQL, Full Specification of DMQL	(6Hrs)		
4	Clustering	4.1 Introduction to Clustering, Distance Measures, Categories of Clustering algorithms 4.2 K-means, and K-medoid algorithms 4.3 Agglomerative Clustering, Concept of Divisive Clustering	(6Hrs)		
5	Classification and Prediction	5.1 Concept of Classification and Clustering, Evaluating Classification Algorithms 5.2 Bayesian Classification, Decision Tree Classification, Concept of Entropy 5.3 Linear Regression, Concept of Non-linear regression	(8Hrs)		
6	Association Rule Mining	6.1 Frequent Patterns, Association Rule, Concept of Support and Confidence 6.2 Apriori Property, Apriori algorithm, Generating Association Rules 6.3 FP-growth algorithm, FP-tree, Generating Association Rules	(8Hrs)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
7	Advanced Data Mining	7.1 Information Retrieval, Measuring Effectiveness of Information Retrieval 7.2 Concept of Time-Series Data and Analysis, Image and Video Retrieval 7.3 Concept of Support Vector Machine and Deep Learning	(6Hrs)		
8	Laboratory Work	Perform the following: 1 Design data warehouse by using SQL Server or Oracle 2 Implement OLAP operations 3 Implement clustering algorithms K-means and K-medoid by using Weka 4 Implement classification algorithms Naïve-Bayes and decision trees by using Weka 5 Implement regression algorithms by using Weka 6 Implement association mining algorithms by using Weka	45hrs		

Recommended Books

1. Jiawei Han, Micheline Kamber, Jian Pei; *Data Mining: Concepts and Techniques*, Morgan Kaufman Publication, 3rd Edition, 2011

References

2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar, *Introduction to Data Mining*, Pearson Publication, First Edition, 2013
3. Charu C. Agrawal, *Data Mining: The Textbook*, Springer Nature Publication, First Edition, 2015

Software Engineering

EG 3213 CT

Year: III
Semester: VI

Total: 6 hour /week
Lecture: 3 hours/week
Tutorial: hour/week
Practical: 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. Introduce the theory and foundations of software engineering
2. Explain Software Project Management
3. Describe some key aspects of a software engineering process
4. Apply fact-finding and problem-solving skills
5. Determine the requirements for a software system
6. Enlist/Explain key aspects of models and processes for design of a software system
7. Apply current trends in the area of software engineering

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to software engineering	1.1 Introduction to software 1.2 Program Vs software 1.3 Software components 1.4 . Characteristics of software 1.5 Types of software 1.6 Generic view of software engineering 1.7 Software process and software process model.	[4]		
2	Software Development Life Cycles Models:	2.1 Build and fix model 2.2 The waterfall model 2.3 Prototyping model 2.4 Iterative enhancement model	[4]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.5 Spiral model 2.6 Rapid application development model (RAD) 2.7 Selection criteria of a lifecycle model			
3	Software Project Management:	3.1 Activities in project management 3.2 Software project planning 3.3 Software project management plan 3.4 Software project scheduling and techniques 3.5 Software project team management and organization 3.6 Project estimation techniques 3.7 COCOMO model 3.8 Risk analysis and management 3.9 Risk management process 3.10 Software configuration management 3.11 Software change management 3.12 Version and release management	[7]		
4	Software Requirement Analysis & Specification:	4.1 Requirement engineering 4.2 Requirement elicitation 4.2.1 Interviews 4.2.2 Brainstorming series 4.2.3 Use case approach 4.3 Requirement analysis 4.3.1. Data flow diagram 4.3.2 Data dictionary 4.3.3 Entity-Relationship diagram 4.3.4 Software prototyping 4.4 Requirement documentation 4.4.1 Nature of SRS 4.4.2 Characteristics of a good SRS 4.4.3 Organization of SRS	[6]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
5	Software Design:	5.1 Objectives of design 5.2 Design framework 5.3 Software design models 5.4 Design process 5.5 Architecture design 5.6 Low level design 5.7 Coupling and cohesion 5.8 Software design strategies 5.9 Function oriented design 5.10 Object oriented design 5.11 Function oriented design Vs Object oriented design	[5]		
6	Software Metrics:	6.1 Software metrics: what & why? 6.2 Token count 6.3 Data structure metrics 6.4 Information flow metrics 6.5 Metrics analysis	[4]		
7	Software Reliability:	7.1 Basic Concepts 7.2 Software quality 7.3 Software reliability model 7.4 Capability maturity model (CMM)	[4]		
8	Software Testing:	8.1 Testing process 8.2 Some important terminologies 8.3 Unit testing 8.4 Integration testing 8.5 System testing 8.6 Regression Testing 8.7 Performance testing 8.8 White Box testing and black box testing 8.9 Acceptance testing 8.10 Alpha and Beta testing 8.11 Debugging techniques, tools and approaches	[6]		
9	Software Maintenance:	9.1 Need for software maintenance 9.2 Types of software maintenance	[3]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		9.3 Software maintenance process model. 9.4 Software maintenance cost			
10	Quality assurance	10.1 Software quality attributes 10.2 Quality factors 10.3 Quality control 10.4 Quality assurance 10.5 Software quality assurance 10.6 Software safety 10.7 The ISO 9000 model 10.8 SEI capability maturity model 10.9 Verification and validation	(2)		
	Practical:	The practical should contain all features mentioned above.	[45]		

Recommended books:

1. Software engineering, Udit Agarwal, publication
2. Fundamentals of Software Engineering by Ghezzi, Jayazeri and Mandrioli, Prentice-Hall.
3. Fundamentals of Software Engineering by Rajib Mall
4. Software Engineering by Ian Sommerville, Addison-Wesley, ISBN 0-201-17568-1
5. Software Engineering by Roger Jones
6. Modern System analysis and design, Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich

E-Governance

EG 3214 CT (Elective)

Year: III
Semester: VI

Total: 7 hour /week
Lecture: 4 hours/week
Case studies: 3 hours/week

Course Description:

This course deals with the introduction, different models for e-Governance, concept of e-Governance, different types of on-line business systems, techniques and implementation for electronics payment system, and legal considerations in e-Governance

Course Objectives:

After completing this course the students will be able to

1. Introduce e-Governance.
2. Explain security issues of e-Governance.
3. Describe the legal and ethical issues of e-Governance/ cyber law.
4. Impart knowledge in management and government projects.

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction:	1.1 History of e-Governance development 1.2 how e-Governance works, 1.3 Categories of e-Governance 1.4 Applications, 1.5 Global trading environment & adoption of e-Governance, 1.7 Difference between traditional Government and e-Governance, 1.8 advantages and disadvantages of e-Governance, 1.9 Benefits of e-Government, 1.10. E-Government life cycle, 1.11 Online service delivery and electronic service delivery, 1.12 Maturity and adoption model	5hrs		
2	Models of e-Governance	2.1 Major challenges of G2G e- 2.2 Governance	[5hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		2.3 Governance to Business (G2B) 2.4 Development of G2B Governance, 2.5 Difference between G2C and G2B e-Governance, 2.6 G2C, G2E			
3	Infrastructure use in e-Governance	3.1 Applications architecture, 3.2 Support systems, 3.4 Datacenter, 3.5 Government gateway, 3.6 Open source software and free software, 3.7 Electronic Data Interchange(EDI): <ul style="list-style-type: none"> • Components of EDI, • protocol, • EDI standards, • Data standards used in EDI, • Electronic funds transfer 	(5 hrs)		
4	Mobile Governance	4.1 Application of M-Governance, 4.2 Advantage of m-Governance, 4.3 Wireless application protocol, 4.4 WAP Browser, 4.5 Mobile Commerce architecture	[6 hrs]		
5	Technology for Online business	5.1 IT Infrastructure, 5.2 Internet, 5.3 Intranet, 5.4 Extranet, 5.5 VPN, Firewall, 5.6 Cryptography, 5.7 Digital signature, 5.8 Digital certificate, 5.9 Hypertext, 5.10 Hypermedia, 5.11 HTTP	5hrs		
6	Electronic payment system (EPS)	6.1 Online banking, 6.2 types of EPS, 6.3 security requirement of EPS,	[10 hrs]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		6.4 Secure socket layer (SSL), 6.5 Secure electronic 6.6 Transaction (SET), 6.7 Payment gateway, 6.8 Online payment processing, and 6.9 Payment processing Network			
7	Security Issues in e-Governance	7.1 e-Governance Security Issues, 7.2 Risks Involved in e-Governance, 7.3 Protecting e-Governance System, 7.4 e-Governance Security tools, 7.5 Biometric, 7.6 Client server Network security, 7.7 Data and message security	[6 hrs]		
8	Legal and Ethical Issues	8.1 Issues related to e-Governance, 8.2 Legal issues, 8.3 Ethical issues, 8.4 Taxation	[4 hrs]		
9	Cyber law	9.1 Aims of cyber law, 9.2 Salient provisions of cyber law, 9.3 Contracting and contract enforcement	[4hrs]		
10	Managing and implementing e-Governance	10.1. Management and strategy of e-Government systems, 10.2. managing public Data, 10.3. Managing and emerging issues for e-Government, 10.4. e-Government system life cycle and project assessment, 10.5. analysis of current reality, 10.6. design of new e-Government system, 10.7. e-Government Risk assessment and mitigation, 10.8. e-Government system construction,	10hrs		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		10.9. implementation and beyond, 10.10.developing e-Government hybrids			
Practical:			45hrs		
Case studies on developed and developing countries on e - Governance development					

References books:

1. Richard Heeks, Implementing and managing e-Government
2. C.S. R Prabhu, e-Governance: Concepts and Case studies, prentice hall of India Pvt. Ltd.
3. J. Satyanarayana, e-Government, , prentice hall of India Pvt. Ltd

E-Commerce

EG 3214 CT

Year: III
Semester: VI

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

Course Description:

This course deals with the introduction, different business models for e-Commerce, concept of mobile computing, different types of on-line business systems, techniques and implementation for electronics payment system, and legal considerations in e-Commerce.

Course Objectives:

After completing this course the students will be able to

5. Introduce the e-commerce.
6. Identify security issues of e-Commerce,
7. Explain the types of payment system and payment gateway.
8. Describe the legal and ethical issues of e-commerce and cyber law,
9. Familiarize with online marketing.

Course Contents:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction:	1.1 History of e-Commerce 1.2 e-Business 1.3 Categories of e-Commerce Applications 1.4 global trading environment & adoption of e-commerce 1.5 Differences between traditional and e-Commerce 1.6 advantages and disadvantages of e-Commerce 1.7 e-commerce framework	[6]		
2	Business Models of e-Commerce	2.1 Business to Business (B2B) 2.2 Business to Consumer (B2C) 2.3 Consumer to Consumer (C2C) 2.4 Development of B2B e-Commerce 2.5 difference between B2C and B2B e-Commerce 2.6 e-Procurement	[6]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
3	The network infrastructure for e-commerce	3.1 Introduction to information superhighway (I-way) 3.2 Requirements of I-way 3.3 components of I-way 3.4 Internet, Intranet, Extranet (Business values of internet, intranet and extranet) 3.5 Software agents, Types of software agents, 3.6 ADSL, Wi-Fi, UMTS (3G), LTE (4G), Bluetooth (uses, advantages)	[6]		
4	Electronic Data Interchange (EDI)	4.1 Concepts of EDI 4.2 EDI Vs e-mail 4.3 Benefits of EDI 4.4 How EDI works 4.5 Security and privacy issues of EDI 4.6 Applications of EDI	[6]		
5	Mobile Commerce	5.1 Application of M-commerce 5.2 Advantage of m-commerce 5.3 wireless application protocol 5.4 WAP Browser 5.5 Mobile Commerce architecture	[6]		
6	Network Security	6.1 e-Commerce Security Issues 6.2 Risks Involved in e-Commerce 6.3 concept of network and computer security 6.4 data and message security 6.5. Firewall (function, types) 6.6 concept of cryptography, types of cryptography (secret key, public key) 6.7 Antivirus, digital signature, digital certificate, certificate authority, third party authentication, SSL, VPN,	[8]		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
8	Electronic payment system (EPS)	7.1 Online banking 7.2 Types of EPS 7.3 Security requirement of EPS 7.4 Secure socket layer (SSL) 7.5 Secure electronic transaction (SET) 7.6 Payment gateway/ online payment processing, and payment processing Network, 7.7 Digital wallet (eSewa) 7.8 Online banking facilities of banks (Nepali banks)	[6]		
9	Legal and Ethical Issues	8.1 Issues related to e-Commerce 8.2 Legal issues, ethical issues, taxation	[3]		
10	Cyber law	9.1 Aims of cyber law 9.2 salient provisions of cyber law 9.3 Contracting and contract enforcement	[5]		
11	Introduction to Entrepreneurship	10.1 Entrepreneurship development 10.2 Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager 10.3 Attributes and characteristics of a successful Entrepreneur 10.4 Entrepreneurial Culture	[4]		
12	Online marketing	11.1 Concept of online marketing 11.2 Online marketing Vs offline marketing 11.3 Tools for online and offline marketing 11.4 Issues with online marketing	[4]		
Practical:			45 hrs		
<ul style="list-style-type: none"> The laboratory exercises should cover all the features mentioned above. Project should be done by students in any e-commerce site(the project should includes: business model, 					

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		payment mode, network infrastructure, marketing strategy, SWOT analysis and working process of site)			

References books:

1. e-Commerce and its applications , U.S. Pandey, Rahul Srivastava, Saurabh Shukla
2. Electronic Commerce, Framework, Technology and applications, Bharat Bhasker
3. Frontiers of electronic Commerce, Ravi Kalakota, Andrew B. Whinston, Pearson Education
4. Noel Jerke, "*E-Commerce Developer's Guide to Building Community and using Promotional Tools*", BPB Publications, 2001.
5. Entrepreneurship Development - Dr. P.C.Shejwalkar
6. P.T. Joseph, "E-Commerce A managerial Perspective", PHI 2002, ISBN 81-203-2089-1
7. Dave Chaffey, "E-business and E-commerce management", Fourth edition, Prentice Hall

Embedded System

EG 3214 CT

Year: III
Semester: VI

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

Course Description:

This course gives the fundamental knowledge of embedded system incorporating hardware, real-time operating system, microcontroller, embedded software development tools and examples of practical embedded system

Course Objectives

After the Completion of this course students will be able to

1. Familiarize basic of the embedded system
2. Implement embedded system for practical use

Course Content:

Unit	Topics	Contents	Hours	Methods/ Media	Marks
1	Introduction to embedded system	1.1 Definition, Classification, Unique Characteristics, Purposes, Design Metrics 1.2 Specific Examples: Digital Camera, Telegraph and Cordless Bar Code Reader 1.3 Hardware fundamental for the software engineer <ul style="list-style-type: none"> • Terminologies: Chips, PCB, Power Supply and Ground • Combinational and Sequential Logic, Open Collector & Tri – stating Output, Hold & Set – Up Time, Clock, Memory (RAM and ROM) 1.4 Microprocessor <ul style="list-style-type: none"> • Basic Structures • Characteristics 1.5 Buses <ul style="list-style-type: none"> • Definition, • Types, • Address Space of Memory, 	(10 hrs)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<ul style="list-style-type: none"> • Simple, Handshake and Strobe (Wait) Protocol 1.6 Other common parts <ul style="list-style-type: none"> • Serial Interface: RS 232, USART • PLA, PAL, Watchdog Timer 			
2	Microcontroller in Embedded System	2.1 8051 Microcontroller Family <ul style="list-style-type: none"> • Microprocessor VS Microcontroller • Selecting a Microcontroller 2.2 Assembly Programming in 8051 <ul style="list-style-type: none"> • Pin configuration and Internal Architecture • Memory Organization • Addressing Modes and instruction Set • Programming examples 2.3 Simple Interfacing <ul style="list-style-type: none"> • Seven Segment and LEDs Interfacing and Programming 	(15 hrs)		
3	Hardware and Software Design Issues	3.1 Custom Single Purpose Processor <ul style="list-style-type: none"> • Definition, • Block Diagram, • Design for Simple Tasks 3.2 Optimize design of Custom Single Purpose Processor 3.3 General Purpose Processor <ul style="list-style-type: none"> • Definition, • Block Diagram, • Operation of Controller and Data path 3.4 Programmers View <ul style="list-style-type: none"> • Programming Language, 	(15 hrs)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<ul style="list-style-type: none"> • Instruction Set, • Addressing Modes 3.5 Development Environment <ul style="list-style-type: none"> • Software Development Process: • Implementation and Verification Phases 			
4	Real-time operating systems and services	4.1 Operating System <ul style="list-style-type: none"> • Definition, Primary Functions, • Kernel: Monolithic and Micro Kernel • General Purpose OS vs Real Time OS 4.2 Basic Functions or Services of RT Kernel <ul style="list-style-type: none"> • Process/ Task Management • File System Management • Memory Management • I/O Subsystem Management • Protection and Security • Time Management • Interrupt Handling • Error Detection and Response 4.3 Process and Thread <ul style="list-style-type: none"> • Process states and State Transition • Difference between Process and Thread • Concept of Multithreading 4.4 Types of Multitasking <ul style="list-style-type: none"> • Co – operative, Preemptive and Non - Preemptive 4.5 Task Scheduling <ul style="list-style-type: none"> • Non – Preemptive Scheduling 	(15 hrs)		

Unit	Topics	Contents	Hours	Methods/ Media	Marks
		<ul style="list-style-type: none"> • First Come First Service (FCFS) • Last Come First Service (LCFS) • Shortest Job First (SJF) • Priority Based Scheduling • Preemptive Scheduling • SJF / SRT (Shortest Remaining Time) • Round Robin Scheduling <p>4.6 Numerical Examples for calculating Wait Time and TAT for Various Scheduling</p> <p>4.7 Device Driver</p>			
5	Embedded software development tools	<p>5.1 Host and target machines</p> <ul style="list-style-type: none"> • Target and Development (Host) Processors, • Cross – Compiler, • Cross – Assembler, • Tool chains <p>5.2 Linker/locators for embedded software</p> <ul style="list-style-type: none"> • Address Resolution, • Locating Program Components Properly • Initializing Data & Constant Strings, • Locator Maps, Executing Out of RAM <p>5.3 Embedded software into the target system</p> <ul style="list-style-type: none"> • PROM Programmers, • ROM Emulators, • In – Circuit Emulators, • Flash, Monitors 	(5 hrs)		

Practical:**(45 hrs)**

Practical will be covering assembly and C programming for 8051 Microcontroller Family using Keil uVision, Proteus and Training Kit.

1. Familiarize with data transfer instruction.
2. Implement arithmetic operation
3. Implement logic operation
4. Implement shift operation
5. Implement branch instruction (Looping and Branching)
6. Implement sub routine call & return instructions.
7. Interface LEDs
8. Interface seven-segment display.
9. Generate square waves of different duty cycles.
10. Develop a mini project on a real-time system.

Text Book

1. Frank Vahid, Tony Givargis, "Embedded system Design: A Unified Hardware / Software Introduction", Wiley India Pvt. Ltd., 2011
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw, Latest Edition
3. David E. Simon, "*An Embedded Software Primer*", Pearson Education Asia, 2013

Major Project

EG 3215 CT

Year: III
Semester: VI

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

Course Description:

This course is to introduce to plan and complete project work related with Computer Engineering 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 of a student to tackle, individually, a selected problem to a reasonable depth of understanding
2. Develop the ability of a student to organize and produce a professional product using an engineering approach
3. Develop the ability of a student to produce technical documentation to a high standard
4. Develop the ability of a student to produce an analytical report which communicates the work carried out in the project and evaluates the final product and the student's contribution

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 supervisor or project supervisor for the approval of project work. (10 percent marks for the proposal.)
2. A progress report to be submitted to the supervisor. An oral presentation of about 15 minutes must be given regarding the project work.(35 percent mark)
3. A final written report will be submitted at the end of project work. The report will be evaluated by the project coordinator, the supervisor and the external examiner nominated by the project coordinator. (10 percent project coordinator 20 percent supervisor and 25 percent external examiner.)

Experts involved:

Content Experts:

1. Balkrishna Neupane, IOE Pulchok Campus
2. Bibha Sthapit, IOE Pulchok Campus
3. Dr. Diwakar Raj Pant, IOE Pulchok Campus
4. Pro. Dr. Subarna Shakya, National Computer Engineering Centre
5. Dr. Dhundiraj pathak , IOE Pulchok Campus
6. Bhoja raj Joshi Pata Multiple Campus
7. Hari Narayan Yadav, Oxford Engineering Campus
8. Jendi bade shrestha, NBPI, Banepa
9. Anup Bhuju, NBPI, Banepa
10. Nripa Dhoj Khadka, IOE Pulchok Campus
11. Rom kant Pandey, Sanothimi Campus
12. Roshan Bhushal, Shakardev Campus
13. Dr. Purushottam Kharel, KU
14. Dr. Sanjeeb Prasad Panday, IOE Pulchok Campus
15. Bhesh Bdr Chaudhary, ACME Engineering college
16. Nawaraj Poudel, TU, Kirtipur
17. Arjun Singh Saud, TU, Kirtipur
18. Min Prasad Aryal, Director, Nepal Telecom Authority