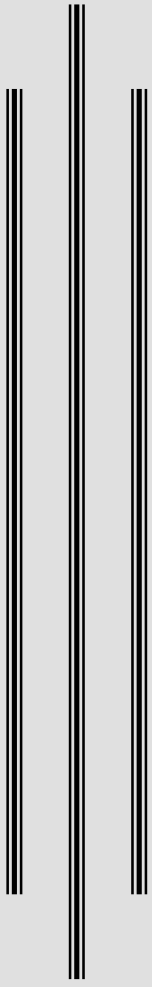
CURRICULUM
for
DIPLOMA
in
Computer Engineering
(Three year program-semester system)



Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

Developed in 2058(2001), 2002 and Second Revision 2010

Table of Contents

1. Background:

Computer Engineering is emerging field in the engineering and technology sector. Many people in the developed countries, developing countries and under developed countries have been given emphasis for the broader application of computer engineering. This field has been helping the world for the overall development and it has been creating jobs opportunities both in public and private sectors as well as has been creating self employment opportunities immensely.

2. Introduction:

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

3. Course title:

Diploma in Computer Engineering (DCE)

4. Programme objectives:

This curriculum has following objectives:

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

5. Course description:

This course is based on the job required to perform by the information related technician at different related industries and organizations in Nepal. Therefore, this curriculum is designed to provide knowledge and skills focusing on computer engineering related to the occupation. 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 course focuses on foundational subjects; the second year course focuses on basic disciplinary subjects of computer engineering. Similarly, the third year comprises of the disciplinary subjects including electives as well. Moreover, the third year focuses on the application of learned skills and knowledge as the minor and major projects.

The foundation subjects like Physics, Chemistry, and Mathematics are included and which are applicable in the field of computer engineering. It also includes language subjects like Nepali and English applicable for the communication in the same area. The disciplinary subjects offering in this programme are included in all semesters. It makes 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 reflect the details of this curriculum. In short, this curriculum will guide its implementers to produce competent and highly employable middle level technical workforce in the field of computer engineering.

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

6. Duration:

The total duration of this curricular program is three years. Each year consists of two semesters of six months each. Moreover, one semester consist of 19.5 academic weeks including evaluation period. Actual teaching learning hours will be not less than 15 weeks in each semester.

7. Target group:

The target group for this programme will be all the interested individuals who have passed SLC with English, Science, and Mathematics or equivalent and related Technical SLC (TSLC).

8. Group size:

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

9. Target location:

The target location will be all over Nepal.

10. Entry qualification:

- The applicant for entry qualification for diploma in engineering course should have SLC pass or equivalent or Technical SLC (TSLC) in related subject. S/he should have English, Science, and Compulsory Mathematics in SLC.

11. Entry criteria:

- Should submit SLC or equivalent certificates
- Should pass entrance examination as administered by CTEVT
- Applicants fulfilling the minimum requirements will be selected for admission on the basis of merit
- Individuals of lower economic status preferred

12. Selection:

Applicants fulfilling the entry criteria will be selected for admission on the basis of merit.

13. Medium of instruction:

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

14. Pattern of attendance:

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

15. Teacher and student ratio:

- For theory: As per the nature of the course.
- For practical / demonstration: 1:10.
- For bench work: 1:5.
- 75 % of the teachers must be full timer.

16. Teachers and demonstrators:

- The teacher must be a master's degree holder in the related area with three years experience in the related field.
- The demonstrator must be bachelor's degree holder in the related area with two years experiences in training activities.

17. Instructional media and materials:

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

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

18. Teaching learning methodologies:

The methods of teachings for this curricular program will be a combination of several approaches. Such as Illustrated Lecture, Tutorial, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork, Report writing, Term paper presentation, Case analysis, Tutoring, Role-playing, Heuristic and Other Independent learning.

- Theory: Lecture, Discussion, Assignment, Group work.
- Practical: Demonstration, Observation, Guided practice and Self-practice.

19. Mode of education:

There will be inductive and deductive mode of education

20. Examination and marking scheme:

- The subject teacher will internally assess the students' achievement in each subject during the course followed by a final examination at the end of each semester.
- A weightage of 20% for the internal assessment and 80% for the semester wise final examination will be allocated for theoretical components of a subject.

- The final semester examinations of all theory components will be conducted through written tests.
- Generally the method of continuous assessment will be adopted for practical components.
- In some cases semester final examinations are also conducted for practical components as per the needs.
- Student who fails in the internal assessment will not be allowed to sit in the semester final examination and will also not allowed continuing the following semester study.

21. Provision of back paper:

There will be the provision of back paper but a student must pass all the subjects of all six semesters within six years from the enrolment.

22. Disciplinary and ethical requirements:

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

23. Pass marks:

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

24. Grading system:

The overall achievement of each student will be measured by a final aggregate percentage of all final semester examinations and graded as follow: -

Marks division:

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

25. Certification and degree awards:

- Students who have passed all the components of all the subjects of all semesters are considered to have successfully completed the course.
- Students who have successfully completed the course will be awarded by a degree of Diploma in Computer Engineering with completed elective subjects.

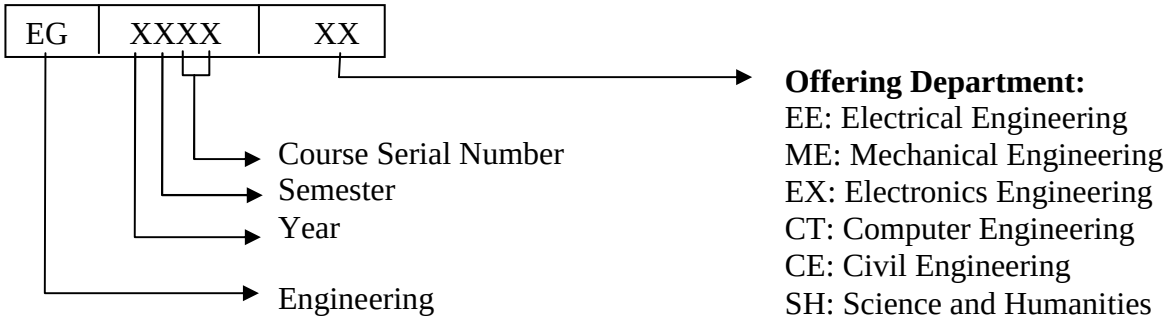
26. Career path:

The graduates will be eligible for the position equivalent to Non-gazetted 1st class (technical) as information Technician or as prescribed by the Public Service Commission of Nepal. The graduate will be eligible for registration with the related Council in the grade as provisioned in the related Council Act (if any).

27. Curriculum and credits:

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

28. Subjects Codes



29. Provision of specialization:

There will be no provision of specializing but some subjects are offered here as the elective subjects; viz Geographical Information System, Computer Simulation and Modeling, Image Processing, Distributed Processing, Data Mining and Data Warehousing, Internet /Intranet, Artificial Intelligence, Computer Graphics, Numerical Methods, Enterprise Resource Planning, Business Information System (BIS) and Telecommunication.

29. Course structure (Diploma in Computer Engineering):

Year: I Part: I

S.N	Code No	Subject	Mode			Total Hours		Distribution of Marks							Remarks
								Theory			Practical			Total	
								Assess. Marks	Final Marks	Time Hours	Assess. Marks	Final Marks	Time Hours		
			L	T	P	Week	Sem.								
1	EG 1101 SH	Communication Nepali	2			2	30	10	40	1.5				50	Continuous Assessment
2	EG 1102 SH	Communication English	2			2	30	10	40	1.5				50	
3	EG 1103 SH	Engineering Mathematics I	4	1		5	75	20	80	3				100	
4	EG 1104 SH	Engineering Physics I	3	1	2	6	90	20	60	3	10	10	2	100	
5	EG 1105 SH	Engineering Chemistry I	3	1	2	6	90	20	60	3	10	10	2	100	
6	EG 1107 CT	Computer Fundamentals	3	1	3	7	105	20	80	3	30	20	3	150	
7	EG 1106 ME	Engineering Drawing I	1		3	4	60				60	40	4	100	
8	EG 1109 CT	Computer Programming in C	3	2	3	8	120	20	80	3	30	20	3	150	
Total			**21**	**6**	**13**	**40**	**600**	**120**	**440**		**140**	**100**		**800**	

Year: I Part: II

S.N	Code No	Subject	Mode			Total Hours		Distribution of Marks							Remarks
								Theory			Practical			Total	
								Assess. Marks	Final Marks	Time Hours	Assess. Marks	Final Marks	Time Hours		
			L	T	P	Week	Sem.								
1	EG 1201 SH	Engineering Mathematics II	3	1		4	60	20	80	3				100	Continuous Assessment
2	EG 1202 SH	Engineering Physics II	3	1	2	6	90	20	60	3	10	10	2	100	
3	EG 1203 SH	Engineering Chemistry II	3	1	2	6	90	20	60	3	10	10	2	100	
4	EG 1204 EX	Logic Circuits	3		3	6	90	20	80	3	30	20	3	150	
5	EG 1205 CT	Object Oriented Programming in C++	3		3	6	90	20	80	3	30	20	3	150	
6	EG 1207 EE	Electrical Engineering	3		3	6	90	20	80	3	30	20	3	150	
7	EG 1208 CT	Web Technology & Programming I	3		3	6	90	20	80	3	30	20	3	150	
Total			**21**	**3**	**16**	**40**	**600**	**140**	**520**		**140**	**100**		**900**	

Year: II **Part: I**

S.N	Code No	Subject	Mode			Total Hours		Distribution of Marks							Remarks
								Theory			Practical			Total	
								Assess. Marks	Final Marks	Time Hours	Assess Marks	Final Marks	Time Hours		
			L	T	P	Week	Sem.								
1	EG 2107 CT	Web Technology & Programming II	3	1	3	7	105	20	80	3	30	20	3	150	Continuous Assessment
2	EG 2104 SH	Engineering Mathematics III	3	1		4	60	20	80	3				100	
3	EG 2105 CT	Data Structure & Algorithm	3	1	3	7	105	20	80	3	30	20	3	150	
4	EG 2106 CT	Visual Programming	3	1	3	7	105	20	80	3	30	20	3	150	
5	EG 2107 EX	Microprocessors	3	1	3	7	105	20	80	3	30	20	3	150	
6	EG 2108 EX	Electronic Devices & Circuits	4	1	3	8	120	20	80	3	30	20	3	150	
		Total	**19**	**6**	**15**	**40**	**600**	**120**	**480**		**150**	**100**		**850**	

Note: Java Script and Dot.net has included in Web Technology & Programming II.

Year: II **Part: II**

S.N	Code No	Subject	Mode			Total Hours		Distribution of Marks							Remarks
								Theory			Practical			Total	
								Assess. Marks	Final Marks	Time Hours	Assess. Marks	Final Marks	Time Hours		
			L	T	P	Week	Sem.								
1	EG 2201 EX	Data Communication	3	1	3	7	105	20	80	3	30	20	3	150	Continuous Assessment
2	EG 2202 CT	Software Engineering	4	1	3	8	120	20	80	3	30	20	3	150	
3	EG 2203 CT	Database Management System (DBMS)	3	1	3	7	105	20	80	3	30	20	3	150	
4	EG 2204 CT	Computer Architecture	3		3	6	90	20	80	3	30	20	3	150	
5	EG 2205 CT	Computer Repair & Maintenance	3		3	6	90	20	80	3	30	20	3	150	
6	EG 2206 SH	Social Studies	2			2	30	10	40	1.5				50	
7	EG 2207 SH	Statistics & Probability	3	1		4	60	20	80	3				100	
		Total	**21**	**4**	**15**	**40**	**600**	**130**	**520**		**150**	**100**		**900**	

Note: SMP and SAD has included in Software Engineering

Year: III — Part: I

S.N	Code No	Subject	Mode			Total Hours/		Distribution of Marks						Total	Remarks
								Theory			Practical				
			L	T	P	Week	Sem.	Assess. Marks	Final Marks	Time Hours	Assess. Marks	Final Marks	Time Hours		
1	EG 3101 CT	Computer Networks	3		3	6	90	20	80	3	30	20	3	150	Continuous Assessment
2	EG 3102 CT	Management Information System (MIS)	3		2	5	75	20	60	3	10	10	2	100	
3	EG 3103 CT	Embedded System	3		3	6	90	20	80	3	30	20	3	150	
4	EG 3104 CT	Computer Graphics	3		3	6	90	20	80	3	30	20	3	150	
5	EG 3105 CT	Applied Operating System	3		3	6	90	20	80	3	30	20	3	150	
6	EG 3106 SH	Technical English*	2			2	30	10	40	1.5				50	
7	EG 3107 CT	Elective - I	4		3	7	105	20	80	3	30	20	3	150	
		(a) Geographical Information System												0	
		(b) Computer Simulation and Modeling												0	
		(c) Image Processing												0	
		(d) Distributed Processing												0	
8	EG 3108 CT	Minor Project			2	2	30				30	20	3	50	
		Total	**21**		**19**	**40**	**600**	**130**	**500**		**190**	**130**		**950**	

Year: III — Part: II

S.N	Code No	Subject	Mode			Total Hours		Distribution of Marks						Total	Remarks
								Theory			Practical				
			L	T	P	Week	Sem	Assess. Marks	Final Marks	Time Hours	Assessment Marks	Final Marks	Time Hours		
1	EG 3201 CT	Multimedia Technology	3	1	3	7	105	20	80	3	30	20	3	150	Continuous Assessment
2	EG 3202 CT	E-commerce	3	1	2	6	90	20	60	3	10	10	2	100	
3	EG 3203 CT	Artificial Intelligence	4	1	3	8	120	20	80	3	30	20	3	150	
4	EG 3204 CT	Elective - II	4	1	3	8	120	20	80	3	30	20	3	150	
		(e) Data Mining and Data Warehousing												0	
		(f) Internet /Intranet												0	
		(g) Advanced Computer Architecture												0	
		(h) Enterprise Resource Planning												0	
		(i) Business Information System (BIS)												0	
		(j) Decision Support System												0	
		(k) Telecommunication												0	
		(l) Distributed Operating System												0	
5	EG 3205 CT	Object Oriented Analysis & Design (OOAD)	4		3	7	105	20	80	3	30	20	3	150	
6	EG 3206 CT	Major Project			4	4	60				60	40	4	100	
		Total	**18**	**4**	**18**	**40**	**600**	**100**	**380**		**190**	**130**		**800**	

*revised

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 1106 ME	Engineering Drawing I
8	EG 1109 CT	Computer Programming in C

कम्युनिकेसन नेपाली

ई.जी. ११०१ एस.एच.

वर्ष: प्रथम **जम्मा: २ घण्टा/ हप्ता**
सेमेष्टर: प्रथम **प्रवचन: २ घण्टा/ हप्ता:**
विशेष: घण्टा/ हप्ता:
प्रयोगात्मक: 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 संचारात्मक नेपाली भाषा ७

१.१ भाषिक भेदको परिचय

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

१.२ दैनिक कार्यमा प्रयोग हुने भाषाको ज्ञान र प्रयोग

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

एकाइ २ लेखन सीप १८

२.१ बोध, बुंदाटिपोट, सङ्क्षेपीकरण र शब्दभण्डारको ज्ञान र अभ्यास

- अनुच्छेद लेखन
- संवाद लेखन
- बुँदा लेखन
- सारांश लेखन
- पत्र लेखन (निमन्त्रणा पत्र, सूचना, सम्पादकलाई चिठ्ठी र निवेदन आदि)
- निवन्ध लेखन

- प्राविधिक तथा पारिभाषिक शब्दहरूको ज्ञान र प्रयोग

२.२ शब्द निर्माणको अभ्यास

- उपसर्ग
- प्रत्यय, (कृत् तथा तद्धित)
- समास

२.३ प्राविधिक/पारिभाषिक शब्दहरूको शब्दस्रोत,

- वर्णविन्यास (प्राविधिक शब्दका सन्दर्भमा आवश्यक मात्र)
- अर्थ र व्युत्पत्तिका लागि शब्दकोशको प्रयोगको अभ्यास

२.४ प्रतिवेदन लेखन

एकाइ ३ कृति परिचय **५**

निम्न लिखित ढाँचामा तलका कृतिको परिचय लेख्ने अभ्यास

३.१ कृतिहरू:

- सौर्य उर्जा
- ट्रेड कोर्श (कालिगढ तालिम) : एक परिचय : इ.अ.सं. पश्चिमाञ्चल क्याम्पस पोखरा ।
- भुकम्पबाट सुरक्षित रहन गर्नु पूर्व तयारी: भूकम्प प्रविधि राष्ट्रिय समाज नेपाल ।
- इन्जिनियरिङ नेपाली: लालानाथ सुवेदी ।
- सिंचाई प्रविधि ज्ञान : भोजराज रेग्मी, त्रि. वि. पाठ्यक्रम विकास केन्द्र

३.२ कृति परिचयको ढांचा

- कृतिको नाम:
- कृतिकारको नाम:
- कृतिका मुख्य विषय: (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)

सिकाई सामग्रीहरू

- त्रि. वि. पाठ्यक्रम विकास केन्द्र, अनिवार्य नेपाली शिक्षण निर्देशन, काठमाण्डौं
- लालानाथ सुवेदी, इन्जिनीयरिङ नेपाली विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौं ।
- लालानाथ सुवेदी, नेपाली व्याकरण, बोध/रचना (सम्बन्धित अंश मात्र) विद्यार्थी पुस्तक भण्डार, भाटाहिटी, 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

Code: EG 1102 SH

Total: 2 hour /week

Year: I **Lecture: 2 hours/week**

Semester: I **Tutorial: hours/week**

Practical: 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. communicate in English language at work/job environment
2. define and use trade related technical terminologies
3. demonstrate various writing skills related to the job
4. demonstrate situational/structural conversation essential for job performance

Course Contents:

Unit 1. Communicative English: [3]

1.1. The structure of English:
- Introduction
- Grammatical units:
  - The word
  - The phrase
  - The clause
  - The sentence
- The grammatical structures:
  - The structure of the phrase
  - The structure of the clause
  - The structure of sentence (functions)
  - The structure of sentence (realizations)

1.2. Everyday functions.
1.3. Requests and offers.
1.4. Direct functions.
1.5. Asking about / expressing.
1.6. Asking about / stating.
1.7. Functions of English.
1.8. Using dictionary
1.9. Reading comprehension
1.10. Collection and definitions of trade related terminologies

Unit 2. Writing skills in English: [15]

2.1 Writing paragraphs
2.2 Writing dialogues
2.3 Writing Précis
2.4 Writing summaries
2.5 Writing letters:
- Applications
- Official letters
- Business letters
- Invitation letters

2.6 Writing essays
2.7 Writing reports:
- General reports
- Technical reports
- Needs assessment reports
- Review reports

2.8 Writing resumes
2.9 Writing bibliographies
2.10 Writing minutes
2.11 Writing notes
2.12 Writing proposals:
- Technical proposals
- Academic proposals

2.13 Writing for action
2.14 Writing for job
2.15 Writing technical articles:
2.16 Using technical journals/articles
2.17 Writing instructions
2.18 Introduction to writing technical manuals
2.19 Writing memos

Unit 3. English sounds and structures: [4]

3.1 Definitions of phonology, sounds of English, morphology, lexicology, syntax, and semantics
3.2 Sounds of English:
- The vowels
- The consonants
- Consonant clusters
- Vowel sequences
- Syllable structure
- Stress
- Intonation

Unit 4. English conversation practices and guidance: [8]

4.1. Situational conversation
4.2. Structural conversation

4.3. Familiarization with English spoken skills for employment during the stage of visa application to workstation in abroad.

4.4. Guidance for:

- TOEFL preparation
- EILTS preparation
- Group discussion and presentation
- Seminar conduction

Learning materials:

1. Poudel, R.C., A Manual to Communicative English, K.P.Pustak Bhandar, Kathmandu, 1956/57.
2. Shah ,B.L.,Atext book of writing skills in English, First edition Hira Books Enterprises, Kathmandu,
3. Fruehling, R. T. and Oldham N. B., Write to the point, McGraw- Hill, Inc. New York NY 10020
4. Tayior, G., English conversation practice, 1975.
5. Maharjan L. B..A textbook of English sounds and Structures, Vidyarthi Pustak Bhandar, Kathmandu, 2000.
6. Todd, LAN introduction to Linguistics, Longman York press, 1991.
7. 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.
8. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Mathematics I

EG 1103 SH

Total: 5 hour /week
Year: I **Lecture: 4 hours/week**
Semester: I **Tutorial: 1 hours/week**
Practical : hours/week

Course Description:

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

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area

1. Trigonometric ratios and equations, inverse circular functions and properties of triangles
2. Straight lines, angle between lines, circle and parabola
3. The progressions, permutations and combinations, binomial theorem, exponential and logarithmic series as well as the quadratic and polygonal equations
4. Sets, limit and continuity, derivatives, integration and integrals.

Course Contents:

Unit 1. Trigonometry: [16]

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: [16]

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 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: [8]

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. Calculus: [20]

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.

4.7. Limit of community.

4.8. Derivatives from definition of simple functions like:
- xn, (ax+b)n, sin (ax +b), eax, ax , and log x.

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

4.10. Integration, Rules for finding integrals.

4.11. Standard integrals and their uses.

4.12. Definite integrals- definition and evaluation.

4.13. Definite integral as limit of sum.

Learning materials:

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

Engineering Physics I

EG 1104 SH

Total: 6 hour /week
Year: I **Lecture: 3 hours/week**
Semester: I **Tutorial: 1 hours/week**
Practical : 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: [14]

1.1 Basic units and measurements:
- Measurement of physical quantities
- Introductory ideas abut dimensions of physical quantities.
- Scalar and Vector: definitions and examples, dot and cross product of two vectors
- Composition and resolution 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 and banked track

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.

1.5. Work, energy, and power:
- Definition and units of work, energy and power.
- Potential and kinetic energy.
- Conservation of energy.
- Conservative forces.
- Transformation of energy.
- Power efficiency.

1.6. Simple harmonic motion (SHM):
- Simple harmonic motion and its characteristics.
- Period, frequency, and amplitude of simple harmonic motion.
- Speed and acceleration in simple harmonic motion.
- Energy of simple harmonic motion.
- Simple pendulum.

1.7. 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: [11]

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.
- 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.
- Barometric height correction.

2.4 Heat Transfer:

- Thermal conduction conductivity and determination of the coefficient of thermal conductivity.
- Convection and convection coefficient.
- 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,
  - isothermal and
  - Isobaric.
- Specific and molar heat capacities for different thermodynamic processes, Cp-Cv =R.
- Second law of thermodynamics.
- Carnot engine, Otto cycle and their efficiencies.

Unit 3. Optics: [10]

3.1 Light and Illumination:

- Nature of light, sources of light, rays.
- Luminous s flux.
- Luminous intensity of a point source.

3.2 Reflection and Refraction by plane Surfaces:

- Review of reflection and refraction by plane surfaces.
- Speed of light in different media.
- Deviation due to reflection and refraction.
- Phenomenon of total internal reflection, critical angle.
- Real and apparent depth.
- Determination of reflective index.

3.3 Reflection by Spherical Surfaces:

- Review of reflection by spherical surfaces.
- Method of construction pf image by ray diagrams.
- Real and virtual images.
- Nature of images formed by spherical mirrors.
- Spherical aberration: parabolic mirror.
- Uses of Mirrors: driving mirror of a car, field of view.

3.4 Refraction through Prisms and Lenses:

- Deviation due to prism and minimum deviation.
- Refraction through lenses.
- Lens maker equation.
- Converging lens, diverging lens and thin lens equation.
- Formation of images by lenses.
- Combination of lenses.
- Magnification,
- Power of a lens.
- Uses of lenses:
  - simple microscope,
  - compound microscope and
  - Telescope
- Human eye.

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.
- Deflection and oscillation magnetometer.

4.2. Earth's Magnetism:

- Horizontal and vertical components of earth's magnetic field.
- Declination and angle of dip.

4.3. Magnetic properties of materials;

- Molecular and modern theory of magnetism.
- Para magnetism and diamagnetism:
  - Permeability and
  - Susceptibility.
- Intensity of magnetization.
- Domain theory of ferromagnetism.
- Hysterisis

Engineering Physics Practical I ***[30]***

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

Learning materials:

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

Engineering Chemistry I

EG 1105 SH

Total: 6 hour /week
Year: I **Lecture: 3 hours/week**
Semester: I **Tutorial: 1 hours/week**
Practical : 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: General chemistry: [8]

1.1 Atom and molecule:
- Definition
- Dalton's atomic theory and modern position of the theory

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

1.3 Molecular Weight:
- Definition
- Avogadro's hypothesis
- Application of Avogadro's hypotheses (Mol. Wt=2×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

1.4 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)

1.5 Simple mole concept:
- Mole of an atom
- Mole of a molecule

- Molar volume and
- Simple calculation on mole concept

Unit: 2: Language of chemistry: [4]

2.1 Symbol:
- Definition
- Significance (qualitative and quantitative)

2.2 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

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

Unit: 3: System of classification: [33]

3.1 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
- 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

3.2 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.H_2SO_4, $CaCO_3$, K_2SO_3

3.3 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

3.4 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

3.5 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 Activity and electrochemical series:

- Definition,
- Action of water, acid and oxygen on metals.

3.7 Corrosion:

- Definition
- Types
- Direct and indirect method and prevention against corrosion

3.8 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
- Preparation of acid and base (at least 2 -methods).
- Properties of acid and base.
- Definition of Salt
- Types of salt (normal, acidic and basic)
- Preparation of salt (at least 3 - methods)
- Concept of hydrogen ion concentration, pH value and pH Scale
- Buffer solution.

3.9 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

Engineering Chemistry Practical I **[30]**

1. Simple Glass Working [6]
   a. to cut the glass tube into three equal parts and round up their shape edges
   b. to bore a hole through a cork
   c. to bend the glass tubing into acute, obtuse and right angle
   d. to draw a jet and capillary tube
   e. to fit up a wash bottle
2. To separate sand and copper sulphate crystals in pure and dry state from the mixture of sand and copper sulphate [2]
3. To separate sand and calcium carbonate in pure and dry state from the mixture of sand and calcium carbonate [2]
4. To prepare pure water from supplied impure water by distillation and o test the purity of the sample prepared [2]
5. To neutralize dilute sulphuric acid with sodium carbonate solution, and to recover crystals of sodium sulphate [2]
6. To obtain pure and dry precipitate of barium sulphate by treating excess of dilute sulphuric acid with barium chloride solution [2]
7. To investigate the composition of water by electrolysis by using Hofmann's apparatus [2]
8. To determine the equivalent weight of reactive metal by hydrogen displacement method. [2]
9. To determine the pH of different unknown solution and using pH paper and universal indicator [2]
10. To prepare primary standard solution of sodium carbonate and to use it to standardize an approximate decinormal acid solution [2]
11. To standardize given unknown acid (Approx N/10) solution by preparing standard alkali solution. (Expression of strength in different ways) [2]
12. To standardize given unknown alkali (approximately N/10) solution with the help of by preparing standard acid solution. (Expression of strength in different ways) [2]
13. To carry out conductivity experiments on solids and liquids (CuSO4, Zn, Mg, Al, Fe, CCl_4, C_6H_6, C_2H_5OH) [2]

Text books:

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

Reference books:

1. Fundamentals of Chemistry, K.R. Palak
2. Inorganic Chemistry, Bahl and Tuli
3. A Text book of Engineering Chemistry, R.S. Sharma
4. A Textbook of Inorganic Chemistry, L.M. Mitra
5. Elementary practical chemistry, M.K Sthapit

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

Total: 7 hour /week

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

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

Practical : 3 hours/week

Course Description:

This course deals with the introduction of the computer, hardware components, computer programming, internet concept and the practical on word processing, Database, Presentation, class work Preparation in the computer.

Course Objective:

After completing this course the student will be able to:

1. understand computer system, its hardware and software
2. use of computers in their daily academic activities
3. explore the world by Internet and email
4. protect their computer by using antivirus software etc.

Course Contents:

Unit 1. Introduction: [5]

1.1 Basic introduction of computers

1.2 History of computers and its generation.

1.3 Importance of computers in 21st century.

Unit 2. Hardware: [16]

Introduction of basic hardware components

- Power supply, casing, motherboards, CPU, Chipset, realtime clock, BIOS

Memories

- Storage devices: magnetic (Hard Disk, Floppy disk) optical (CDs and DVDs (, pen drive.
- RAM, ROM, EPROM, VRAM

Input / output parts

- Parallel ports, serial parts, interfacing (IDE,SATA,PATA,ATAPC)

Unit 3. Programs: [12]

Operating system and its importances (DOS, Windows, UNIX, LINUX introduction only)

Application programs and its importances. (Office package, photo editing package)

Device drivers concepts.

Unit 4. Concept of internet: [12]

4.1 Browser programs (Internet explorer, Netscape, Mosilla etc.)

4.2 Concept of http, www, ftp

4.3 E-mail concept

4.4 Connect to internet from home using modem

4.5 Very basic concept of small office, college networking

Practical: **[45]**

1. Identification of hardware components
2. Tools required to assembling a computer
3. Safety precaution concept
4. Assembling of a computer properly
5. Loading OS and drivers
6. Hard disk management (partitioning / formatting)
7. Installation of OS and configurations
8. Installation of application programs
9. Installation of utilities programs
10. Practice with
    - Word processing
    - Database
    - Presentation
    - Prepare presentation of class work

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

Reference books:

Fundamentals of Computer by Leon / Leon

Engineering Drawing I

EG 1106 ME

Total: 4 hour /week

Year: I **Lecture: 1 hours/week**

Semester: I **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. represent different shapes accurately by applying geometrical constructions
2. project point, line, plane and geometrical solids
3. represent 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 PanchalV.M., Engineering Drawing, Charotar Publishing House, 2001.
3. Gill P.S, Engineering Drawing, S. K. Kataraia & Sons, New Delhi, 2004/2005

Computer Programming in C

EG 1109 CT

Total: 8 hour /week

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

Semester: I **Tutorial: 2 hours/week**

Practical : 3 hours/week

Course Description:

This course deals with the Computer Fundamentals, Problem Solving Method Introduction to C, Basic Input and Output, Structured Programming Fundamentals, Functions, Arrays, Pointers and Strings Structures Files and Files Handling in 'C'

Course Objective:

After the completion of this course the students will be able

1 to develop the working knowledge of problem solving by using the computer methods, systems and languages.
2 to develop programming skills using C.

Course Contents:

Unit 1. Computer Fundamentals: [3]

- 1.1 Computer Evolution (History and Generations)
- 1.2 Computer Hardware (Block diagram of digital computer)
- 1.3 Computer Software and its types
- 1.4 Programming Languages

Unit 2. Problem Solving Method: [3]

- 2.1 Problem Analysis
- 2.2 Algorithm Development and Flowcharting
- 2.3 Programming
- 2.4 Compilation and Execution
- 2.5 Debugging and Testing
- 2.6 Program Documentation

Unit 3. Introduction to C: [3]

- 3.1 Features of C
- 3.2 Data types in C
- 3.2 Operators and Expressions
- 3.3 Basic Elements in C

Unit 4. Basic Input and Output: [3]

- 4.1 Character Input/Output
- 4.2 Formatted Input/ Output
- 4.3 Programs using Input/Output statements

Unit 5. Structured Programming Fundamentals: [7]

- 5.1 Sequential Structure
- 5.2 Repetitive Structure
- 5.3 Selective Structure
- 5.4 Programs using Decision making and Looping

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

6.1 Introduction
6.2 Function Components (Function Prototypes, Call and Definition)
6.3 Return statement, Passing by value & Passing by reference
6.4 Storage classes (Local, Global and Static storage class)
6.5 Recursion

Unit 7. Arrays, Pointers and Strings **[10]**

7.1 Introduction & Manipulation of Arrays
7.2 Arrays of Strings
7.3 Pointers and its Applications
7.4 Pointers Arithmetic
7.5 Relation between Arrays and Pointers
7.6 Arrays as Function arguments
7.7 Dynamic memory allocation
7.8 String and String handling Functions

Unit 8. Structures **[6]**

8.1 Declaring and Defining Structures
8.2 Arrays of Structures
8.3 Hierarchical Structures
8.4 Union, self referential structure and Bit fields of structure

Unit 9. Files and Files Handling in 'C': **[5]**

9.1 At the end of course, students are recommended to do a simple project covering all the features mentioned above.

Practical: **[45]**

1. The laboratory exercises should cover all the topics mentioned above.
2. 12 laboratory exercises growing in complexity to the development of program must be conducted including the knowledge depicted form the above topics.
3. Out of 3 laboratory sessions, 2 sessions must be dedicated to developing simple project and 1 laboratory session for evaluation.

Reference books:

1. Bryons S. Gotterfried, "*Programming with C"*, TMH
2. K R Venugopal, "*Programming with C "*, TMH
3. Yashvant Kanetkar, "*Let us C*"
4. Brain W. Keringhan & Dennis M. Ritchie, "*The C programming Language*"
5. Kelly and Pohl, "*A book on C*", Benjamin/Cummings
6. Herbert Schildt, "*C The complete reference*", TMH

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 1204 EX Logic Circuits
5 EG 1205 CT Object Oriented Programming in C++
6 EG 1207 EE Electrical Engineering
7 EG 1208 CT Web Technology & Programming I

Engineering Mathematics II

EG 1201 SH

Total: 4 hour /week

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

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

Practical: hours/week

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: [5]

- 1.1. Vectors in plane, addition and subtraction.
- 1.2. Composition and decomposition of vectors.
- 1.3. Vectors in space.
- 1.4. The unit vectors i, j, k
- 1.5. Product of two vectors-
  - dot product,
  - cross product,
- 1.6. Simple applications.

Unit 2. Algebra: [15]

- 2.1. Complex number in the from A+ ib.
- 2.2. Algebra of complex numbers.
- 2.3. Polar representation of complex numbers.
- 2.4. De Moivre's theorem and its applications
- 2.5. Linear inequalities and their graphs.
- 2.6. System of linear inequalities in two variables,
- 2.7. System of linear inequalities in two variables,
- 2.8. Linear programming: Problems involving two variables under given linear constraints

2.9. Determinants and matrices,
2.10 Algebra of matrices,
2.11 Properties of determinants,
2.12. Ad joint and inverse of matrices.
2.13. Solution of linear equations using cramers' rule
2.14. Row equivalent matrices
2.15. Idea of polynomial equations

Unit 3. Calculus: [12]

3.1. Applications of derivatives-
- Tangents and normal to a curve taking slope as derivative
- Maxima and minima of a function
- Derivative as rate of change

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

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

Unit 4. Geometry: [4]

4.1. Coordinates in space,
4.2. Coordinates in planes.

Unit 5. Statistics: [9]

5.1. Statistics:
- Introduction to statistics
- Measures of Central Tendency
- Measures of Dispersion
- Moments, Skew ness 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
- Concept of theoretical probability distribution

5.3 Concept of normal curve and normal distribution
5.4. Concept of sampling, estimation and tests of significance

Learning materials:

1. A Text book of Statistics – B.C. Bajracharya
2. Elementary Statistics – H. C. Saxena
3. Statistical Methods – Mrigendralal Singh
4. 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.
5. 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

Total: 6 hour /week

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

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

Practical: 2 hours/week

Course Description:

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

Course Objectives:

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

1. explain the basic concepts related to the electricity and apply it in the field of the related engineering area
2. explain the basic concepts related to the waves and apply it in the field of the related engineering area
3. explain the basic concepts related to the properties of matter and apply it in the field of the related engineering area
4. explain the basic concepts related to the modern physics and apply it in the field of the related engineering area

Content Contents:

Unit 1. Electricity: [16]

1.1. Electrostatics:

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

1.2. Current electricity:

- Basics:
- D.C. Current.
- Strength of Current.

- Potential difference across a conductor.
- Ohm's law and its verification.
- Resistance and resistivity.
- Mechanical measurements:
- Galvanometer.
- Ammeter and voltmeter
- Potentiometer and measurement of emf.
- Whitestone bridge
- Kirchhoff's law and their use to analyze simple circuits.
- Heating effect of current:
- Joules law
- The rate of heating from the concept of p.d.
- Thermoelectricity:
- See-beck effect
- Peltier effect and
- Thomson effect.
- Chemical effect of current:
- Faraday's law of electrolysis.
- Accumulator.

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 crockscrew rule.
- Force applied by magnetic field on current carrying conductor.
- Torque on current carrying coil in magnetic field.
- Theory of moving coil galvanometer.
- Biot-Savart's Law
  - Field due to a long straight conductor and due to circular coil.
  - Force between two parallel conductors carrying current.
- Ampere’s law
  - Magic field due to the solenoid or toroid 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.
- Reflection of sound waves.
- Interference of sound waves.
- Diffraction of 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.
- Distraction of light waves.
- Huygen's principle.
- Polarization and un polarized 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 contract.
- 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, Viscous forces at higher relative velocities (qualitative).
- Temperature dependence of the coefficient of viscosity of liquid and gases.

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, transistor action and uses of npn transistor

4.3 Nuclear physics:

- Laws of radioactive disintegration: half life, mean life, and decay constant.
- Stable and radioactive nuclei.
- Binding energy.
- 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 (For Both Parts I and II):

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

Supplementary text:

1. College Physics by sears, Zemansky and Young, Fourth edition 1985

Text book for laboratory work:

1. Physics Practical Guide by U.P. Shrestha, RPB

Text book for numerical problems:

1. Numerical exercise in physics volume I and volume II -
   Prepared by Physics Dept., Pulchowk Campus, and published by Institute of Engineering.

Other learning materials:

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

Engineering Chemistry II

EG 1203 SH

Total: 6 hour /week

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

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

Practical: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

1. explain the basic concepts related to the followings and apply them in the field of related engineering works:
   - Nonmetals and their compounds
   - Metals and their compounds
   - 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 "Sulpher 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:
- 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

2.6 Zinc:
- Properties & uses

2.7 Iron:
- Properties & uses

2.8 Lead:
- Properties & uses

2.9 Alloys:
- Definition
- Purpose of making alloys
- Composition,
- Properties and uses of alloys of steel, aluminum, copper and zinc

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

3.1. Organic compounds
- Organic compounds:
  - Historical background, classification, and nomenclature
  - Functional groups and homologous series
- Comparison of aliphatic and aromatic compounds
- Saturated hydrocarbon: Properties of Methane
- Unsaturated hydrocarbon: Properties of Ethylene and Acetylene

- Aromatic compounds: Properties of Benzene

3.2. **Synthetic materials:**

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

Engineering Chemistry Practical II:

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

Textbooks:

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

Reference books:

1. Inorganic chemistry, Bahl & Tuli
2. Elementary Organic Chemistry, P.N. Bargava
3. Fundamentals of chemistry, K.R. Palak
4. A text Book of Inorganic Chemistry, L.M. Mitra

Logic Circuits

EG 1204 EX

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

Course Description:

This course is specially designed for the students of diploma level who have completed either SLC of equivalent SLC (technical SLC). This course is focused to study, design and applicable by devices/ equipment that are based on digital techniques.

Course Objective:

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

1. learn design methods for combinational logic circuit
2. verify truth tables of basic gates universal gates
3. learn design concert of sequential logic circuits
4. design problem based / predefined logic based circuits

Course Contents:

Unit 1. Introduction: **[2]**

- 1.1 Analog Signal and Digital Signal
- 1.2 Advantages of Digital over Analog Signals
- 1.3 Representation of Digital Signal
- 1.4 Applications of Digital Signal

Unit 2. Number Systems and Codes: **[4]**

- 2.1 Two State Devices
- 2.2 Decimal Number System
- 2.3 Binary Number System
- 2.4 Octal Number System
- 2.5 Hexadecimal Number System
- 2.6 Conversions among Different Number Systems
- 2.7 Fractions Conversion
- 2.8 BCD Code
- 2.9 Gray Code
- 2.10 Alphanumeric Code
  - ASCII Code
  - EBCDIC Code

Unit 3. Arithmetic Logic Operations: **[7]**

3.1 Binary Arithmetic

- Binary Addition
- Binary Subtraction
- Binary Multiplication
- Binary Division

3.2 9's and 10's Complement Method

- 9's Complement Subtraction
- 10's Complement Subtraction

3.3 1's Complement and 2's Complement Method

- 1's Complement Subtraction
- 2's Complement Subtraction

Unit 4. Logic Gates: [6]

4.1 Basic Gates: AND, OR, NOT

4.2 Universal Gates: NAND, NOR

4.3 Exclusive Gates: XOR, XNOR

4.4 Logic Equations

4.5 Truth Tables

4.6 The Universal Properties of the NAND Gates

4.7 The Universal Properties of the NOR Gates

4.8 Pulse Operation in Logic Gates

4.9 Combination of Logic Gates

4.10 Building Logic Circuits from Logic Equations

4.11 Forming Logic Equations from Logic Circuits

Unit 5. Boolean Functions and Logic Simplification: [7]

5.1 Boolean Algebra and its Properties/Laws

5.2 Boolean Expression in Logic Gates

5.3 Simplification of Boolean Expressions

5.4 DeMorgan's Theorems

5.5 Karnaugh Map

- K-Map Simplification for Two Input Variables
- K-Map Simplification for Three Input Variables
- K-Map Simplification for Four Input Variables

5.6 Sum of Product (SOP) Simplification

5.7 Product of Sums (POS) Simplification

5.8 Maps with *Don't Care* Conditions

Unit 6. Combinational Logic Circuits: [9]

6.1 Adders

- Half Adder
- Full Adder
- Parallel n-Bit Adders

6.2 Subtractors

- Half Subtractors
- Full Subtractors
- Parallel n-Bit Subtractors

6.3 Encoders

- Decimal to Binary Encoder
- Decimal to BCD Encoder
- ASCII Encoder
- Encoder IC Packages

6.4 Decoders

- Binary to Decimal Decoder
- Four Bit Binary Decoder
- BCD to Decimal Decoder
- Seven Segment Display Decoder
- Decoder IC Packages

6.5 Multiplexers

- Data Transmissions
- 4-to-1 Multiplexer
- 8-to-1 Multiplexer
- Multiplexer IC Packages

6.6 Demultiplexers

- Demultiplexer and Decoder Relations
- 1-to-4 Demultiplexer
- 1-to- 16 Demultiplexer
- Demultiplexer in IC Packages

Unit 7. Sequential Logic Circuits: [7]

7.1 Latch and Flip-Flops

- RS Flip-Flop and its Truth Table

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

7.2 Shift-Registers

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

7.3 Counters

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

Unit 8. Digital Displays: [3]

8.1 LED Display

8.2 LCD Diplay

8.3 Gas Display

8.4 7- Segment Display

8.5 Alphanumerical Display

8.6 Digital Clock Display Design

Practical: [45]

1. Experiments on logic operation and verify with truth tables of basic gates: AND, OR, NOT, NAND, NOR
2. Verify the universal properties of the NAND gate and NOR gate.
3. Experiments on logic operation and verify with truth tables of basic gates: XOR, XNOR Gates
4. Building logic circuits from logic equations

5. Realize the pulse operation in different logic gates
6. Realize and verify truth tables applying DeMorgan's Theorems
7. Realize and verify truth tables of binary half adder/Subtractor and full adder/Subtractor
8. Realizing the function of decimal to 3-4 bit binary binary encoder
9. Realizing the function of 4 bit binary binary decoder
10. Realizing the function of 4-to-1 multiplexer and 1-to- 4 demultiplexer circuits.
11. Realizing the function of latches and flip-flops, RS,D,JK,T flip-flops
12. Realizing the function shift-registers: SISO,SIPO,PISO and PIPO
13. Realizing the function ripple counters
14. Realizing the function synchronous counters
15. Realizing and designing of seven-segment display-decoder logic circuit

Reference books:

1. Principle of Digital Electronics- P. Malvino
2. Digital Fundamentals- T. Flyod
3. Logic Circuits- M.Mano

Object Oriented Programming in C++

EG 1205 CT

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

Course Description:
This course deals with the object oriented programming technique using the C++ programming language.

Course Objectives:
After completing this course the students will be able to:

1. analyze the problem with object oriented approach
2. design the problem using object oriented design methods
3. implement the problem in C++ in object oriented way
4. understand various object oriented concepts such as class/object, abstraction, inheritance, operator overloading, dynamic binding, templates etc in C++ programming language

Course Contents:

Unit1. Object Oriented Programming: [4]

1.1. Software Evolution

1.2. Basics of object oriented programming

- Procedure oriented programming
- Object oriented programming
- Procedure oriented versus Object oriented programming

1.3. Elements of Object Oriented programming

- Class & Object
- Abstraction & Encapsulation
- Inheritance
- Polymorphism
- Dynamic binding
- Message passing

1.4. Object oriented languages

1.5. Advantage and Disadvantage of OOP

Unit2. Introduction to C++ [2]

2.1. History and Evolution of C++

2.2. Why C++

2.3. Features of C++

2.4. C++ Vs C

Unit3. C++ Language Basics: [7]

3.1. Character set, tokens (keywords, identifiers, operators)

3.2. Commenting

3.3. Variable declaration

3.4. Data type

3.5. Type Conversion and promotion rules

3.6. Input/Output basics

3.7. Preprocessor directives

3.8. Control structures

3.9. Array, Pointer, String

3.10. Dynamic memory allocation

3.11. Functions

- Function overloading
- Default argument
- Inline function
- Pass by reference
- Return by reference

3.12. const construct

3.13. Structure and Unions

Unit4. Object and Class: [8]

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

Unit5. Overloading Operators: [5]

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)

5.6. Operator overloading using friend operator functions (unary and binary)

5.7. Index operator overloading

5.8. Data conversion

- Basic to basic (explicit and implicit)
- Basic to user defined and vice versa
- User defined to user defined

Unit6. Inheritance: [5]

6.1. Base and derived class (definition with diagrams)

6.2. protected access specifier (show whole class syntax including protected)

6.3. Syntax of derived class declaration (visibility modes)

6.4. Types of inheritance

- Single
- Multiple
- Hierarchical
- Multilevel
- Hybrid
- Multipath (virtual base class)

6.5. Scope of inherited member functions and variables

6.6. Constructors in derived and base class

6.7. Destructor in Derived and base class

6.8. Member function and data overriding

6.9. Ambiguity in member access in overriding members

6.10. Virtual base class

Unit7. Virtual functions: [3]

7.1. Pointer to derived class object

7.2. Array of pointers to derived class objects with function overriding

7.3. Need of virtual functions

7.4. Virtual functions definition

7.5. Pure Virtual functions and Abstract classes

7.6. Virtual Destructor

Unit8. Input/Output Streams and Files: [7]

8.1. Input/Output Stream class hierarchy

8.2. Unformatted Input/Output

8.3. Formatted Input/Output

- ios Stream class member functions and flags
- Standard manipulators
- User defined manipulators

8.4. File I/O with streams

8.5. File stream class hierarchy

8.6. Operations on files

8.7. ASCII and Binary files

8.8. Opening file, file modes and closing files

8.9. File read/write using stream and using read & write function

8.10. File pointers and their manipulators

8.11. Testing for errors during file operations

Unit9. Templates: [4]

9.1. Function Template

9.2. Overloading function template

- Overloading with functions
- Overloading with other template

9.3. Class Template

9.4. Function definition outside of the class template

Practical: [45]

The lab exercise shall different aspects and features of the C++ programming language.

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

8. Program to convert data from user defined to fundamental data and vice versa, and user defined to user defined type
9. Program to inherit the base class to add new functionality in the base class
10. Using virtual functions pointer to objects in program
11. Binary and ASCII file manipulation
12. Program to create and use function and class templates

Reference books:

1. Robert Lafore, “Object Oriented Programming in C++”, Fourth Edition, Waite Group/Galgotia Publication, India
2. Deitel & Deitel, “C++ How to program”, Second Edition, Pentice Hall India
3. Herbert Schildt, “C++: The Complete Reference”, Fourth Edition, Tata McGraw Hill, India

Electrical Engineering

EG 1207 EE

Total: 6 hour /week
Year: I **Lecture: 3 hours/week**
Semester: II **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. understand the fundamentals of electricity and electromagnetism
3. understand the use of DC and AC supply
4. develop the understanding of electric sources and loads

Course Contents:

Unit 1. Electromagnetism and Electromagnetic Induction: [6]

1.1. Definition of magnetic field, magnetic flux, flux density, filed 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. Nortorn'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. *A textbook of Electrical Technology* by B.L Theraja and A.K. Theraja
2. *Fundamentals of Electrical Engineering* by J. B. Gupta
3. *Principles of Electrical Engineering* by Vincent Del Toro
4. *Foundations of Electrical Engineering* by R.J. Cogdell

Web Technology and Programming I

EG 1208 CT

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

Course Description:
This course deals with the web technology its parts and programming in web technology.

Course Objectives:
After completing this course the students will be able to:
1. be familiar with the basic technique of web technology and web page design
2. apply recent software used in web technology

Course Contents:

Unit1. Introduction: Internet & Web: [5]
- 1.1. History and growth of Internet and Web
- 1.2. Introduction to WWW
- 1.3. Web Browsers and Search Engines
- 1.4. Internet protocols and applications
- 1.5. Overview of various internet & web technologies

Unit2. HTML/DHTML: [15]
- 2.1. Introduction
- 2.2. Objectives
- 2.3. Structure of HTML/DHTML
- 2.4. Document
- 2.5. Switching between opened Windows and browser (Container tag, Empty tag, Attribute)
- 2.6. Basic Tags of HTML: HTML, HEAD, TITLE, BODY (Setting the Fore color and Background color, Background Image, Background Sound)
- 2.7. Heading tag (H1 to H6) and attributes(ALIGN),
- 2.8. FONT tag and Attributes (Size: 1 to 7 Levels, BASEFONT, SMALL, BIG, COLOR)
- 2.9. Paragraph Formatting (P)
- 2.10. Break Line BR
- 2.11. Comment in HTML (<! >)
- 2.12. Formatting Text (B, I, U, EM, BLOCKQUOTE,PREFORMATTED, SUB, SUP, STRIKE)
- 2.13. Ordered List- OL (LI, Type- 1, I, A, a; START,VALUE)
- 2.14. Unordered List - UL (Bullet Type- Disc, Circle, Square, DL, DT, DD)
- 2.15. ADDRESS Tag
    - 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>

Unit3. Web Page Authoring Using HTML: [5]

3.1. Tables:
Creating Tables, Border, TH, TR, TD, CELLSPACING, CELLPADDING, WIDTH, COLSPAN, CAPTION, ALIGN, CENTER

3.2. Frames:
Percentage dimensions, Relative dimensions, Frame - Src, Frameborder, 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>

Unit4. Forms: [5]

4.1. Definition

4.2. Use – Written to a file, Submitted to a database such as MSAccess or MySql

4.3. E-mailed to someone in particular

4.4. Forms involve two-way communication

4.5. 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>

Unit5. HTML Editors & Tools: [5]

5.1. Use of different HTML editors and tools like Dreamweaver, Microsoft Front Page etc.

5.2. Graphical and Animation Tools: Use of Different graphical and animation tools like Abode Photoshop and Flash etc.

5.3. Adding Sounds and Animation to the web page (using embed tag)

Unit6. Document Object Model: [10]

6.1. Concept and Importance of Document Object Model

6.2. Dynamic HTML documents and Document Object Model.

6.3. Cascading Style Sheets

- Introduction to Cascading Style Sheet (CSS),
- Three ways of introducing the style sheets to your document.
  - Basic Syntax; Creating and saving cascading style sheets. <STYLE> tag.
  - 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, TEXT-TRANSFORM; TEXT-ALIGN, TEXT-INDENT, LINEHEIGHT
  - Introduction to Margin, Padding and Border
    MARGINS (all values), MARGIN-PROPERTY, PADDING (all

values), PADDINGPROPERTY; BORDER (all values), BORDER-PROPERTY, BACKGROUNDIMAGE, BACKGROUNDREPEAT

- Additional Features, Grouping Style Sheets, Assigning Classes
- Introduction to Layers, <LAYER>, <ILAYER> tag

Practical: [45]

The Laboratory work includes all the implementation of chapter 2 to chapter 6 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. Pfaffenberger, "World Wide Web Bible", BPB Publication
2. Mccoy, "Mastering Web Design", BPB Publication
3. Evans, "10 Minute Guide to HTML", Prentice Hall of India Limited (PHI)
4. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
5. C. Xavier, "Web Technology & Design", New Age International Publishers.
6. Ann Navarro, "Effective Web Design", BPB publications.
7. Raj Kamal, "Internet & Web Design", Tata McGraw Hill
8. E Stephen,Will Train, "HTML 4.0", BPB publication
9. C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill

Second Year

(Third and Fourth Semesters)

Third Semester

Subjects:

1. EG 2107 CT Web Technology and Programming II
2. EG 2104 SH Engineering Mathematics III
3. EG 2105 CT Data Structure & Algorithm
4. EG 2106 CT Visual Programming
5. EG 2107 EX Microprocessors
6. EG 2108 EX Electronic Devices & Circuits

Web Technology and Programming II

EG 2107 CT

Total: 7 hour /week

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

Semester: I **Tutorial: hours/week**

Practical : 3 hours/week

Course Description

This course is designed to provide theoretical knowledge and practical expertise of different technologies involved in Web Technology and various Scripting Languages for designing interactive web applications with a special emphasis on DOT NET Technology.

Course Objectives

After completing this course the students will be able to

1. understand basics of various Scripting Languages.
2. be familiar with an up-to-date survey of developments in Web Technologies.
3. create interactive web sites and maintain them
4. understand and develop web based applications using Microsoft .NET framework

Course Contents

Unit 1. Introduction [2]

- 1.1 Server side and Clint Side Scripting
- 1.2 Advantages and Disadvantages

Unit 2. Internet introduction Client Side Scripting using Java Script [10]

- 2.1 Introduction of internet technology
- 2.2 Adding Java script to HTML page
- 2.3 Java script fundamental
- 2.4 Java Script Data types
- 2.5 Variables and operators
- 2.6 Functions and control structure
- 2.7 Object based programming with Java Script and Event handling
- 2.8 Image, event and form objects
- 2.9 Form validation, JQuery

Unit 3. VISUAL BASIC .NET and Server Side Scripting using ASP. NET [22]

- 3.1 Introduction to DOT NET Technology
- 3.2 Object oriented programming with server side scripting
- 3.3 Intro to object oriented programming in visual basis .net
- 3.4 Procedures
- 3.5 Advanced data types, Control Structures
- 3.6 Exception handling
- 3.7 Inheritance
- 3.8 Interfaces and collection

3.9 Introducing ASP.NET
3.10 Web site adding and configuring server controls
3.11 Exploring specialized server controls
3.12 Create custom web controls
3.13 Input validation and site management
3.14 Programming the web application
3.15 Customizing and personalizing a web application
3.16 Globalization and accessibility
3.17 Using ASP.NET, AJAX control toolkit

Unit 4. Database [12]

4.1 Introduction to SQL
4.2 Database design
4.3 Queries and Data Manipulation
4.4 Grouping and aggregating data
4.5 Views
4.6 Transactions
4.7 Stored procedures and triggers
4.8 Privileges and security

Database Connectivity

4.9 Connecting server side script to database
4.10 Making SQL queries
4.11 Fetching data sets getting data about data
4.12 Multiple connections
4.13 Building in error checking
4.14 Creating SQL database with server side scripting
4.15 Displaying queries in tables
4.16 Building forms from queries

Unit 5. XML [10]

5.1 Introduction
5.2 XML syntax rules
5.3 XML Validator
5.4 XML Browsers
5.5 XML XSL
5.6 Introduction to XSLT
5.7 XSLT template, value of, for each, sort, if , choose
5.8 Introduction to Document Type Definitions
5.9 XML schema
5.10 Ado.NET and XML with ASP.NET

Unit 6. Database [2]

6.1 Basic Concept of AJAX, SOAP and other web services

Practical: [45]

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 a list provided by the instructor.

Reference Books

1. Duthie, *"ASP.NET Step by Step"* , PHI
2. G. A. Duthie, "*Microsoft® ASP.NET Programming with Microsoft Visual Basic® .NET Version 2003 Step By Step "* Andrew Duthie
3. Sybex, *"ASP, ADO and XML Complete"*, BPB Publication

Engineering Mathematic III

EG 2104 SH

Total: 4 hour /week

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

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

Practical : hours/week

Course Description:

This subject consists of five units related to analytical solid geometry, partial differential equations, infinite series, Fourier series, and Fourier integral necessary to develop mathematical background helpful for the understanding and practicing diploma in electronics and Computer Engineering.

Course Objectives:

After completing this course the student will able to:

1. provide the basic mathematical idea for the analysis of electronics circuits
2. help in the development of program for the technical applications

Course Contents:

Unit 1. Analytical Solid Geometry: [7]

- 1.1 Curves in space,
- 1.2 Tangent line, and tangent plane,
- 1.3 Ellipsoid, hyperboloids, and paraboloids,
- 1.4 Projection of areas.

Unit 2. Partial Differential Equations: [11]

- 2.1 Review of Ordinary Differential Equations,
- 2.2 Analysis of P.D.E of 1^{st} and 2^{nd} order,
- 2.3 Linear equations of the 1^{st} order and the general solutions,
- 2.4 P.D.E of 2^{nd} order, its derivation and basic concepts,
- 2.5 Solution of general P.D.E with constant coefficients, complimentary solution and integral solution,
- 2.6 Wave equations

Unit 3. Infinite Series: [10]

- 3.1 Definitions of sequence and infinite series,
- 3.2 Condition for convergence of an infinite series,
- 3.3 Test of convergence, alternating series test,
- 3.4 Power series and its interval of convergence,
- 3.5 Expansion of functions using Taylor's and Maclaurin's theorems.

Unit 4. Fourier Series: [8]

- 4.1 Periodic function,
- 4.2 Trigonometric series,
- 4.3 Fourier series of the functions of period 2p,
- 4.4 Euler's formula,
- 4.5 Fourier series of a function having arbitrary period,
- 4.6 Even and odd functions and their Fourier series,
- 4.7 Half range functions.

Unit 5. The Fourier Integral: [9]

5.1 Fourier integral and inversion formula,
5.2 Frequency and phase spectra,
5.3 Fourier analysis of step and delta function.

Reference books:

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

Data Structure & Algorithm

EG 2105 SH

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

Course Description:

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

Course Objectives:

After completing this course the student will be able to:

1. learn how the choice of data structures and algorithm design methods impacts the performance of programs.
2. implement ADTs such as stacks, queues, lists, trees, and algorithms such as searching, and sorting
3. gain experience writing programs in C/C++

Course Contents:

Unit 1. Introduction: **[3]**

1.1 Abstract Data Type
- Definition
- Methods of Specifying ADT
- ADT data structure

1.2 Array implementation of Data Structure

Unit 2. Stack and Queue: **[6]**

2.1 Stack as an ADT and Operation
- Continuous implementation of Stack with varying and fixed TOS

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

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

Unit 3. Link list as an ADT: **[8]**

3.1 Definition

3.2 Structure of link list

3.3 Advantage and disadvantages of link list

3.4 Operations in Singly Linked list
- Insertion at the beginning and end, after the node, before the node

- Deletion at the beginning and end, after the node, before the node

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

Unit 4. Recursion: [3]

4.1 Definition
4.2 Properties of recursion
4.3 TOH and its solution
4.4 Solution of Fibonacci sequence and factorial

Unit 5. Trees: [6]

5.1 Tree concepts
5.2 Binary tree
5.3 Application of binary tree
5.4 Node representation
5.5 Operation in Binary Tree
- Insertion
- Deletion

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

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

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

Unit 6. Sorting: [6]

6.1 Definition
6.2 Types of sorting
- Internal and external

6.3 Algorithm of exchange sort
6.4 Algorithm of bubble sort
6.5 Algorithm of queue sort
6.6 Algorithm of insertion sort
6.7 Algorithm of selection

Unit 7. Search: [6]

7.1 Sequential search

7.2 Binary search
7.3 Tree search
7.4 Definition
7.5 Components of searching
7.6 Hashing
- Definition
- Hash function and hash table
  - Collision resolution algorithm
    - Open Addressing
    - Linear and quadratic probing
    - Chaining

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

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

Practical: [45]

1. Implement stack
2. Implement layer and circular queue
3. Solve TOH & Fibonacci sequence
4. Implement linked list: singly and doubly
5. Implement trees
6. Implement sort
7. Implement search
8. Implement graphs: graph traversal
9. Implement Hashing
10. Implement Heap

References books:

1. Micheal Berman, “Data Strcutures Via C++” Objects by Evolution, Oxford

Visual Programming

EG2106CT

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

Course Description:

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

Course Objectives:

After completing this course the students will be able to

1. use the integrated development environment for program development
2. write visual programs with event handling
3. write visual programs with file handling and database management
4. understand the working of visual programs

Course Contents:

Unit 1. Introduction: [5]

- 1.1 The Integrated Development Environment
- 1.2 The Elements of User Interface
- 1.3 Event Driven Programming
- 1.4 Properties, Methods and Events of Common Controls
- 1.5 Developing Application (MDI, SDI)

Unit 2. The Language Basics: [9]

- 2.1 Data types
- 2.2 Variables, Constants and their scopes
- 2.3 Expressions and Mathematical operators
- 2.4 Type conversion
- 2.5 Array and Collections
- 2.6 Loops and Conditions
- 2.7 Procedures (Subroutine, Functions)
- 2.8 Argument passing by reference and value
- 2.9 Recursion

Unit 3. The Form and Basic Controls: [13]

- Creating forms
- Loading, closing, showing and hiding forms
- Label
- Textbox
- Command button
- Option button/check box/Frame
- List/Combo box
- Scrollbar
- Picture box/Image box
- Adding menu to form

Timer
The common dialog control
Different properties, methods and events of form and controls
Adding other active X controls

Unit 4. Drawing: [6]

Coordinate systems and Units
Drawing lines and circles
Drawing different shapes
Specifying and using color
PSet and Point Methods
The Paint Event
Processing Images

Unit 5. Working with files: [5]

5.1 Opening test/binary files
5.2 Closing files
5.3 Sequential file access
5.4 Random file access
5.5 Storing and recovering information from file

Unit 6. Working with database: [7]

Introduction to database and Database Management Systems
Creating tables and fields in database
Using Visual database manager or access to create a database
The data control and binding it with other controls
Entering, validating and accessing fields in database
Using DAO and ADO data objects in programming

Practical: [45]

The lab exercise shall cover the language basics, GUI design, use of different controls, drawing different shapes, file handling, Database programming, calling windows API etc using Visual Basic language.

1. Overview of Visual Basic IDE
2. Application Development using wizards
3. Using Arrays in application
4. Using subroutine and functions
5. Creating and adding forms/menu in application
6. Using basic controls such as text box, command button, combo box, list box etc in application
7. Drawing lines, circles and other shapes
8. Using files to store and retrieve data for application
9. Using Active X Controls such as tree view, Rich Edit, Flex Grid, etc in application
10. Using DAO to create database applications
11. Using ADO to create database applications
12. Using Windows API functions in VB application

References books:

1. Michael Halvorson, “Microsoft Visual Basic 6.0 Professional Step by Step”, Second Edition, Microsoft Press
2. Francesco Balena, “Programming Microsoft Visual Basic 6.0”, Microsoft Press
3. Microsoft Corporation, “Microsoft Visual Basic 6.0 Programmer's Guide”, Microsoft Press
4. Any book on Visual Basic 6 or newer version can be used during study

Microprocessors

EG2107 EX

Total: 7 hour /week

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

Semester: I **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. understand the working principle of a computer
2. understand the working principle of microprocessor
3. understand the process of writing and executing low level language
4. know how to interface devices with a computer

Course Contents:

Unit1. Introduction to Microprocessor: [8]

- 1.1. History of computer development
- 1.2. Analog and digital computer
- 1.3. Microprocessor, microcomputer, microcontroller
- 1.4. Stored program concept and von-Neumann's architecture
- 1.5. General architecture of a microcomputer system showing control buses
- 1.6. History of x86 microprocessors
- 1.7. Block diagram of a typical microprocessor and microcontroller
- 1.8. Programming languages
- 1.9. Instruction set of microprocessors
- 1.10. Introduction to Simple as Possible (SAP1,SAP2,SAP3) computers

Unit2. Microprocessor architecture and the instruction set: [8]

- 2.1. Internal architecture of 8085 microprocessor
- 2.2. Instruction and data formats
- 2.3. Instruction classifications
- 2.4. Addressing modes in 8085
- 2.5. 8085 Instruction set

Unit3. Assembly language programming for 8085: [9]

- 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

Unit4. Interfacing I/O and memory devices: [10]

- 4.1. 8085 machine cycles and bus timing
  - Fetch and execute cycles

- Memory read/write machine cycle
- I/O read/write machine cycle

4.2. Address Decoding
- Unique and non-unique address decoding
- Address decoding for I/O and memory devices

4.3. Interfacing I/O devices
- Interfacing Input Devices
- Interfacing Output Devices
- Address decoding using block decoders
- Interfacing Memory-mapped I/O

4.4. Memory Interfacing
- Memory structure and its requirement
- RAM and ROM chips
- Address decoding using NAND and block decoders

4.5. Direct memory access

Unit5. 8085 Interrupt processing: [6]

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

Unit6. Introduction to general purpose programmable peripheral devices: [4]

6.1. 8255 Programmable Peripheral Interface
6.2. 8254(8253) Programmable Interval Timer
6.3. 8259 Programmable Interrupt Controller
6.4. 8251 USART

Practical: [45]

The practical exercise shall cover the low level program from simple programs for data transfer to complex programs for table processing

1. Basics of microcomputer system through the 8085 microprocessor trainer kit
2. Programs that uses data transfer instructions
3. Programs that uses arithmetic instructions
4. Programs that uses logical instructions
5. Programs with conditional and unconditional branching
6. Programs with conditional and unconditional subroutine call and stack
7. Programs involving loops and counters
8. Programs that involves masking and checking numbers
9. Programs to manipulate table of numbers
10. Program for BCD and ASCII manipulation
11. Programs to perform multiplication and division
12. 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. Albert Paul Malvino, Jerald A. Brown, “Digital Computer Electronics”, McGraw-Hill

Electronic Devices and Circuits

EG 2108 EX

Total: 8 hour /week
Year: II **Lecture: 4 hours/week**
Semester: I **Tutorial: 1 hours/week**
Practical : 3 hours/week

Course Description:t

This course deals with different electronic devices and circuits related to computer engineering.

Course Objectives:

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

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

Course Contents:

Unit1. Basic Passive Devices: R, C and L: [4]

Construction, types, color coding and characteristics.

Unit2. Introduction to electron vacuum tubes: Diode, Triode and Pentode: [4]

Unit3. Semiconductor Devices (Especially Si Devices): [9]

3.1 Energy levels, valence and conduction bands, conduction of electrons and holes in solids.
3.2 Intrinsic and extrinsic semiconductor devices (Si), impurities, doping, majority and minor charge carries in P – type and N – type materials. Definition is characteristic.
3.3 Diffusion and drift currents – definition and characteristics.
3.4 PN Junction and depletion layer and potential barrier – definition and characteristics.
3.5 Forward and reverse biasing of PN junction diode – IV characteristics, principles of operation, and effects of temperature and junction capacitance.
3.6 Forward and reverse breakdown of PN junction diode – Zener and avalanche effects – Principles of operation and IV characteristics.
3.7 Electrical analysis of PN junction diode with IV characteristics and mathematical expressions with equivalent model circuit diagrams.

Unit4. Power Supplies: [5]

4.1. Basic rectifying circuits – Types, working principles, characteristics and applications.
4.2. Analysis of simple DC voltage power supplies – Principles, characteristics and ripple (voltages) factors.
4.3. Simple voltage regulation using Zener diodes – Principles, circuits, characteristics and application.

Unit5. Pripolar Junction Transistors (npn and pnp) – Types, construction, working principle as an amplifier and characteristics: [14]

5.1. Classification of amplifiers: CB, CE and CC amplifier circuits – Working principles, basic circuits to investigate input and output IV characteristics and their results.

5.2. Other characteristics of BJT – Saturation and cutoff modes: Definition, circuits, principles and characteristics.

5.3. Types of amplifier circuits: Class A, class B and class C – Definition characteristics and applications.

5.4. Specifications and data book.

Unit6. Field Effect Transistor (JFET and MOSFETS) – Types, construction, working principles as an amplifier and characteristics: [12]

6.1. Basic circuits for investigating input and output IV characteristics – Working principles, characteristics and applications.

6.2. Saturation, cut off breakdown and ohmic regions of operation – Investigation of IV characteristics curves.

6.3. Specifications and data book.

Unit7. Special Semiconductor Devices – Working principles, functional circuits, characteristics and applications: [12]

7.1. UJT, PUT, SCR, Diar and Triac.

7.2. Photo voltaic effects and solar cells.

7.3. Photodiode, phototransistor, LED, LDR, optocouplers and isolators.

7.4. Tunnel diode, schottyky diode, GaAs Transistors, MESFET.

7.5. Charge coupled devices, Hall effects, solid state relay ad thermister.

Practical: [45]

1 Diode characteristics – PHJ diode and Zener diode
2 BJT characteristics – C.E. input and output characteristics
3 FET characteristics – C.S. input and output characteristics
4 HW and FW rectifier – waveforms and characteristics
5 UJT characteristics – IV characteristics
6 PUT characteristics – IV characteristics
7 SCR characteristics – IV characteristics
8 Tunnel diode characteristics – IV characteristics
9 Photo diode characteristics – IV characteristics

Reference books:

1. Basic Electronics Solid State - B.L. Theraja
2. Electronic Principles - Sanjay Sharma
3. Electronic Devices - Thomas L. Floyd
4. Principles of Electronics - Albert Paul Malvino
5. Electronics Vil ! to Vol 7 - Harry Moleaf
6. Basic Radio Vol 1 to Vol 6 - Marvin Tepper

Fourth Semester

Subjects:

1. EG 2201 EX Data Communication
2. EG 2202 CT Software Engineering
3. EG 2203 CT Database Information System (DBMS)
4. EG 2204 CT Computer Architecture
5. EG 2205 CT Computer Repair & Maintenance
6. EG 2206 SH Social Studies
7. EG 2207 SH Statistics & Probability

Data Communication

EG 2201 EX

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

Course Description:

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

Course Objectives:

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

1 introduce telephone network,
2 introduce different types of transmission system,
3 conceptualize multiplexing and multiple access techniques of telephone network,
4 describe the principles of pulse code modulation,
5 describe different types of switching techniques and systems.

Course Content:

1. Introduction (4 hrs)
- 1.1 Public-switched telephone network (PSTN)
- 1.2 Network topology, central office switch
- 1.3 Subscriber telephone, subscriber loop, telephone conversation
- 1.4 Hierarchical networks

2. Transmission (6 hrs)
- 2.1 Comparison between analog and digital transmission
- 2.2 Transmission media (twisted pair, coaxial cable, optical fiber, radio and microwave)
- 2.3 Transmission impairments (distortion, noise, interference, crosstalk, echo, singing, jitter)

3. Multiplexing and multiple access techniques (10 hrs)
- 3.1 Multiplexing and concentration, space-division multiplexing (SDM)
- 3.2 Time-division multiplexing (TDM)
- 3.3 Frequency division multiplexing (FDM)
- 3.4 Wavelength-division multiplexing (WDM)
- 3.5 Frequency division multiple access (FDMA)
- 3.6 Time-division multiple access (TDMA)
- 3.7 Code-division multiple access (CDMA)
- 3.8 Space-division multiple access (SDMA)
- 3.9 ALOHA, slotted-ALOHA, CSMA/CD

4. Pulse code modulation (PCM) (10 hrs)
- 4.1 PCM generation, companding in PCM,
- 4.2 μ-law and A-law
- 4.3 PCM transmission format (T1, and E1 lines)
- 4.4 Frame and multiframe, frame and multiframe alignment strategy

4.5 Line codes (AMI, HDB3 and B8ZS)

4.6 Higher order PCM, plesiochronous digital hierarchy (PDH), synchronous digital hierarchy (SDH) and SONET

5. Switching techniques and system (10 hrs)

5.1 Message switching

5.2 Packet switching

5.3 Circuit switching

5.4 Manual switching

5.5 Electro mechanical switching

5.6 Electronic switching

5.7 Stored control program

5.8 Space-division switching

5.9 Time-division switching

5.10 Space-time division switching

5.11 Multiple stage switching

5.12 Digital cross connect

5.13 Private branch exchange

6. Background Study (5 hrs)

6.1 Introduction and necessity of computer networking

6.2 Different types of multiplexing: Simplex, Duplex, Half Duplex

Practical:

Practical will be covering all the chapters mentioned above. The students should visit the communication related company and prepare the report.

Text Book

1. Stallings, W. *Data Communication and Computer Networks*, Seventh Edition, New Delhi: Prentice-Hall of India Limited, 2004

Software Engineering

EG 2202 CT

Total: 8 hour /week
Year: II **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 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. understand fundamentals of system analysis and design
2. understand the theory and foundations of software engineering
3. understand Software Project Management
4. understand some key aspects of a software engineering process
5. apply fact-finding and problem-solving skills
6. determine the requirements for a software system
7. understand key aspects of models and processes for design of a software system
8. understand the process of analysis and design using the object-oriented approach
9. be aware of current trends in the area of software engineering

Course Contents:

Unit 1. Introduction to system analysis and design [8]

1.1 A modern approach to systems analysis and design
1.2 System development role and responsibilities
1.3 Types of Information systems and systems development
1.4 Developing Information systems and the system development life cycle

Unit 2. Introduction to software engineering [5]

2.1 Software Engineering Fundamental
- General definition
- Program versus software
- Software process
- Software characteristics
- Software applications

2.2 Some terminologies:
- Deliverables and milestones
- Product and process
- Measures, metrics and measurement
- Software process and product metrics
- Generic and customized software product

2.3 Roles of management in software development
- People, product, process and project

Unit 3. Software Development Life Cycles Models: [6]

3.1 Build and fix model
3.2 The waterfall model
3.3 Prototyping model
3.4 Iterative enhancement model
3.5 Spiral model
3.6 Rapid application development model (RAD)
3.7 Selection criteria of a lifecycle model

Unit 4. Software Project Management: [6]

4.1 Responsibilities of software project Manager
4.2 Project planning
4.3 Metrics for project size estimation
4.4 Empirical Estimation technique
4.5 COCOMO-A heuristic estimation technique
4.6 Scheduling
4.7 Organization and team structure
4.8 Staffing
4.9 Risk Management
4.10 Software Configuration Management

Unit 5. Software Requirement Analysis & Specification: [8]

5.1 Requirement engineering
5.2 Requirement elicitation
- Interviews
- Brainstorming series
- Use case approach

5.3 Requirement analysis
- Data flow diagram
- Data dictionary
- Entity-Relationship diagram
- Software prototyping

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

Unit 6. Software Design: [6]

6.1 Design concepts, importance and objectives
6.2 Modularity
- Cohesion
- Coupling
- Relation between cohesion and coupling

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

6.4 Function oriented design
6.5 IEEE recommended practices for software design
6.6 Object oriented design

Unit 7. Software Metrics: [5]

7.1 Software metrics: what & why?
7.2 Token count
7.3 Data structure metrics
7.4 Information flow metrics
7.5 Metrics analysis

Unit 8. Software Reliability: [5]

8.1 Basic Concepts
8.2 Software quality
8.3 Software reliability model
8.4 Capability maturity model (CMM)

Unit 9. Software Testing: [6]

9.1 Testing process
9.2 Some important terminologies
9.3 Functional testing
- Boundary value analysis
- Equivalence class testing
- Decision table based testing
- Special value testing

9.4 Structural testing
- Path testing
- Cyclomatic complexity
- Graph metrics
- Data flow testing
- Mutation testing

9.5 Levels of testing
9.6 Debugging techniques, tools and approaches
9.7 Testing tools

Unit 10. Software Maintenance: [5]

10.1 Introduction
10.2 Maintenance process
10.3 Maintenance model
10.4 Estimation of maintenance costs
10.5 Regression testing
10.6 Reverse engineering
10.7 Software Re-engineering
10.8 Configuration management
10.9 Documentation

Practical: **[45]**

The practical should contain all features mentioned above.

Recommended books:

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

Database Management System
EG 2203 CT

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

Course Description:

This course deals about fundamental concept, theories and popular principles of database management systems. The major focus is mapping the theories into real-life by developing an appropriate database application software. This makes the learning-teaching process more interactive and interesting.

Course Objectives:

At the end of the course student will be able to

1. provide a theoretical foundation to fundamentals of database design and database systems development;
2. provide sufficient practical exposure by problem analysis, logical design of system, queries for insert, update and retrieval of data using standard RDBMS
3. give students an understanding of the problem in its context, the need for adequate documentation of the system and management of data to ensure that the information produced is relevant, accurate and maintainable.

Course Contents:

Unit 1: Introduction [8 Hrs]

1.1 Understand and apply the terminologies: *data, information, flat-file, database, database systems, database management system, data warehouse, data mining;* Early data processing; DBMS: *evolution, characteristics of database approach, ANSI/SPARC database architecture, advantages and disadvantages*; Data independence; data abstraction; Centralized and Distributed database, Database administrator, Data dictionary.

Unit 2: Data models [6 Hrs]

2.1 Definition, Type of data models: *record based, object based and physical*; Hierarchical, Networks, *Relational*, Object oriented and ER models; Logical design of database: *ER Diagram and Schema Diagram. Entities and entities sets, attributes and its types, Relationship and mappings*

Unit 3: Relation Database [5 Hrs]

3.1 Relational *Database*: *Structure and its importance*; The Relational algebra: fundamental operations- *selection, projection, cartesian product, set difference, union, intersection, join, division and rename.* Relation Calculus: *tuple and domain calculus*; Schemas, instances and views.

Un it 4: Relational Languages [5 Hrs]

4.1 Structure Query Language: *component and types*; Data Definition Language: *data types, size and constraints;* Data Manipulation Language: *operators, functions, clauses, subqueries*, QBE and GQBE.

Unit 5: Relational Database Design [5 Hrs]

5.1 Introduction, *constraints* and its types; Functional dependency: *multivalued and join dependencies*, Normalization: Normal Forms - *1NF, 2NF, 3NF and BCNF*; Trigger

Unit 6: Security [3 Hrs]

6.1 Needs of *security*, Security and integrity violations, Access control, Authorization, Security and Views, Encryption and decryption.

Unit 7: Query Processing [3 Hrs]

7.1 Introduction to *query* processing, Query interpretation, Equivalence of expressions, Query Optimization, Join strategies, Query decomposition.

Unit 8: Filing and File Structure [4 Hrs]

8.1 Needs of filing; Overview of storage devices: *cache, main memory; flash memory, magnetic disk and buffer management*; Organization of records: *Fixed length and variable length,* blocks; File organizations: *The sequential and the indexed sequential file organizations*; Hash and Heap piling.

Unit 9: Crash Recovery [3 Hrs]

9.1 Introduction to *crash* recovery and its importance, Failure classification, Backup-recovery, Log-based recovery, Shadow paging.

Unit 10: Concurrency Control [3 Hrs]

10. Transaction and *Transaction* processing, Transaction model, Scheduling and serializability, Locking and Lock based protocols, Time-stamping-based protocols

Laboratory:

The course will be supplemented by assignments/project work. The assignments can involve the design of a schema for a realistic application, and the implementation and coding of the entire application using QBE and SQL on a relational database system. There shall be 15 laboratory exercises based on MS-Access and ORACLE to cover theoretical studied and leading laboratory works into an individual project with allocation of 10% sessional mark.

Text Book:

1 R.E. Mani and S.C Nevathe, *Fundamentals of Database Systems*, Benjamin/Cummings Publishing Co. Inc.

2 Bhim Bhandari, *Concept and Design of Database Management Systems*, Oxford College of Engineering and Management, First Edition, 2010.

Reference Books:

1 A.K Majumdar and P. Bhattacharaya, *Database Management Systems*, Tata McGraw Hill, India.

2 H.F. Korth and A. Silberschatz, *Database System Concepts*, McGraw Hill.

3 Date, C.J., An Introduction to Database, 7th Edition, Addison Wesley . 2000. ISBN: 81 -7808-231-4.

Computer Architecture

EG 2204 CT

Total: 6 hour /week

Year: II **Lecture: 3 hours/week**
Semester: II **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:

Unit 1. Basic computer architecture: [6]

1.1 Introduction
- History of computer architecture
- Overview of computer organization
- Memory Hierarchy and cache
- External Memory
- Organization of hard disk

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

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

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

Unit 2. Micro programmed control: [8]

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

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

2.3 Micro program
- Symbolic Micro program
- Binary Micro program

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

Unit 3. Central processing Unit: [12]

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

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

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

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

Unit 4. Computer arithmetic and memory organization: [10]

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

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

4.3 Division Algorithms:
- Divide overflow
- Hardware Algorithm

- Floating Point Arithmetic Operations
- Basic considerations-Register Configuration

4.4 Memory concept

- Main Memory-
- Auxiliary Memory
- Associative Memory:

4.5 Memory Hardware Organisation

- Match Logic-
- Read operation and Write operation.
- Cache memory
- Associative Mapping
- Direct Mapping
- Set-Associative Mapping
- Writing into Cache-Cache Initialization.
- Virtual Memory-Address space and Memory space-

4.6 Address mapping Using Pages

- Associative Memory page table
- Page Replacement-Memory Management Hardware
- Segmented-Page Mapping-

Unit 5. Pipeline, vector processing and multiprocessors: [9]

5.1 Parallel Processing

- Pipelining-Arithmetic
- Pipeline-Instruction

5.2 Pipeline Examples

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

5.3 Vector Processing:

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

Practical: **[45]**

8085 Assembly Language program:

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

Text books:

1. Morris Mano.M., Computer System architecture, PHI, 1993.

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.

Repair and Maintenance

EG 2205 CT

Year : III **Total: 6 hours / week**
Semester : I **Lecture: 3 hours / week**
Tutorial: hour / 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. Understand basic operation, classification and role of the computer
2. Maintenance of computer, its accessories and peripherals
3. Care of computer and its accessories

Course Contents:

Unit 1. Introduction to Computer **(0.5)**

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.

Unit 2. Classification of Computer **(0.5)**

2.1 Analog, Digital, Hybrid Computer.
2.2 Super, Mainframe, Micro-computer.
2.3 General and Special Purpose Computer.

Unit 3. Role of Computer: (0.5)

3.1 Education,
3.2 Health, Industries,
3.3 Transportation,
3.4 Research,
3.5 Business.

Unit 4. Computer History and Generation (2.5)

Unit 5. System Case: (2)

5.1 Style and size,
5.2 Form Factors,
5.3 Switches,
5.4 LEDs,
5.5 Drive bay.

Unit 6. Power Supply: (2)

6.1 Ratings,

6.2 Working Principle,
6.3 Block Diagram,
6.4 SMPS Concept.

Unit 7. Mother Board and System Devices: (2)

7.1 Form factor,
7.2 Parts,
7.3 Chipset and controller,
7.4 Buses,
7.5 BIOS.

Unit 8. Input Devices: (1)

8.1 Keyboard,
8.2 Mouse,
8.3 Light pen,
8.4 and other devices.

Unit 9. Processor: (5)

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).

Unit 10. Storage Devices (12)

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

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

Unit 11. Video Display: (2)

11.1 Video modes,
11.2 resolution,
11.3 color,
11.4 size

Unit 12. Monitors: (4)

12.1 CRT (Simple working Principle),
12.2 LCD.

Unit 13. Printers: (1)

13.1 Impact, non-impact,

13.2 Static or Laser,

13.3 Non-static or inkjet and bubble jet.

Unit 14. UPS. (1)

14.1 Introduction to UPS.

Unit 15. System Care (9)

15.1 **Preventive Maintenance:**

- General system care factors,
- Cooling and Ventilation,
- Power protection,
- Data loss and virus protection).

15.2 **Data problem detection:**

- Virus detection and protection,
- Background of viruses,
- Virus scanning and antivirus software

15.3 **Backup and Disaster Recovery:**

- Risk of data,
- Backup methods devices and media,
- Backup scheduling,
- Recovery of data.

Laboratory Work (45 hrs)

Unit 1. Identification and Selection of Required Tools

1.1 Physical Assembly procedure:

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

1.2 Installation of Operating Systems:

- Management of Hard Disk (Partition and formatting), BIOS setup and installation of Operating system (Windows, Linux, Redhat etc), Installation of Device drivers, Configuration, Installation of Application Programs and antivirus.

1.3 Connecting Multiple Computers Together:

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

1.4 **Troubleshooting and Repairing Techniques:**

- System Case, LEDs or Case Buttons, Key Lock, Power Sources and Power Protection Devices Cooling fans, air circulation, Motherboard and System Devices, General Failures, CMOS Memory or Real-Time Clock, System BIOS, Resources and Expansion Cards, Processor, System Memory, Memory Not Recognized, Out of Memory Problems, Performance Issues, Video Cards, Failure or Improper Operation, Image Quality Problems, Performance or Video Mode Issues, Monitors, Failure or Improper

Operation, Hard Disk Drives, Booting or Operation Problems, Configuration Issues, Disk Compression Issues, Drive Letter Issues, File System Problems, Operating System, CD/DVD-ROM Drives, Drive Not Recognized, Configuration Problems, Audio Issues, Peripheral I/O Ports, Keyboards, Mice, Modems, Network Card, Operation and Connection Problems, Speed Issues, Applications Program Failure.

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

सामाजिक अध्ययन

(EG 2206 SH)

Total: 2 hour /week
Year: II **Lecture: 2 hours/week**
Semester: II **Tutorial: hours/week**
Practical : hours/week

कोर्षको परिचय

यस विषयमा विद्यार्थीहरूले सामाजिक विशेषताहरू, मानव र समाजसंग भएका विभिन्न सम्बन्धहरू, सामाजिक तथा साँस्कृतिक परिवर्तन सम्बन्धी कार्यहरू, वातावरण र पर्यावरण, समाजसेवा र सामुदायिक विकास एकाईहरू, सामाजिक अनुसन्धान, गांमीण श्रोतहरू, नेपालको उत्पत्ति नेपालका कुराहरू र आर्थिक अवस्था, पररा्ष्ट्रनीति तथा शासन व्यवस्था र जनसंख्या शिक्षासंग सम्बन्धित इकाईहरू समावेश गरिएका छन् ।

कोर्षको उद्देश्य :

यस पाठ्यांशको अध्ययनबाट विद्यार्थीहरूले निम्नलिखित कुरा सक्नेछन्:-

१ सामाजिक विशेषताहरूको व्याख्या गर्न,
२ मानव र समाजसंग भएका विभिन्न सम्बन्धहरूको चर्चा गर्न,
३ सामाजिक तथा साँस्कृतिक परिवर्तन सम्बन्धी कार्यहरू को व्याख्या गर्न,,
४ वातावरण र पर्यावरण को व्याख्या गर्न,,
५ समाजसेवा र सामुदायिक विकासको व्याख्या गर्न,
६ सामाजिक अनुसन्धानका कार्य गर्न,
७ गांमीण श्रोतहरू पहिचान गर्न,
७ नेपालको उत्पत्ति नेपालको आर्थिक अवस्था, पररा्ष्ट्रनीति तथा शासन व्यवस्थाको व्याख्या गर्न
८ जनसंख्या शिक्षाको वयान गर्न,

पाठचांशको विषयवस्तु

१. सामाजिक विज्ञान (Social Science)
   - (क) समाजशास्त्र र ग्रामीण र समाजशास्त्रको परिचय
   - (ख) समाजशास्त्रको प्रकृति र वैज्ञानिक पद्धति
   - (ग) सामाजिक विज्ञान र भौतिक विज्ञान बिचको अन्तर
   - (घ) विज्ञान र इन्जिनीयरिङ्ग
   - (ङ) विज्ञान र प्रविधि
   - (च) विज्ञान र धर्म
   - (छ) विज्ञान र समाज

२. मानव र समाज (Man and Society)
   - (क) समाज, संस्कृति र व्यक्तित्व, बानी, परम्परा र फेशन
   - (ख) जाति, भाषा, धर्म, पेशा, रहनसहन
   - (ग) सामाजिक वर्ग व्यवस्था
   - (घ) समाजमा महिलाहरुको स्थिति

३. सामाजिक तथा साँस्कृतिक परिवर्तन (Social Cultural Changes)
   - (क) सामाजिक तथा साँस्कृतिक परिवर्तनका अर्थ
   - (ख) सामाजिक तथा साँस्कृतिक परिवर्तनका सिद्धान्तहरु
   - (ग) सामाजिक परिवर्तनका विशेषताहरु
   - (घ) सामाजिक तथा साँस्कृतिक परिवर्तनका कारक तत्वहरु
   - (ङ) औद्योगीकरण र सामाजिक परिवर्तन

(च) ग्रामीण सामाजिक परिवर्तन
(छ) औद्योगिक र ग्रामीण समाजका लक्षणहरु
(ज) शहरीकरण

४. वातावरण र पर्यावरण (Environment and Ecology)
(क) वातावरण र पर्यावरणको अर्थ
(ख) वातावरण पर्यावरण संरक्षणको आवश्यकता र महत्व
(ग) वातावरण र कानुनको सामान्य इतिहास

५. समाज सेवा र सामुदायिक विकास (Social Services and Community Development)
(क) सामुदायिक विकास परियोजनाको अर्थ र उद्देश्य
(ख) सामुदायिक विकास कार्यक्रम
(ग) जनसहभागिता र सामुदायिक विकास
(घ) समाज सेवाको अर्थ, क्षेत्र र उद्देश्य
(ङ) सामाजिक कार्यकर्ताको अर्थ, प्रकार, गुण र भूमिका

६. सामाजिक अनुसन्धान (Social Research)
(क) परिभाषा, प्रकृति, उद्देश्य र प्रकार
(ख) सामाजिक अनुसन्धानका प्रेरकर्ताहरु
(ग) सामाजिक अनुसन्धानका प्रमुख चरण

७. ग्रामीण श्रोतहरु (Rural Resources)
(क) मानवशक्ति
(ख) जलश्रोत
(ग) भूमि
(घ) जनसम्पदा
(ङ) खनिजशक्ति
(च) सौर्यशक्ति
(छ) वायुशक्ति

८. नेपाल शब्दको उत्पत्ति (Origin of Nepal Word)

९. विश्व मानचित्रमा नेपाल (Nepal in the World Map)

१०. आर्थिक अवस्था (Economic System)
(क) कृषि, व्यापार, उद्योग, यातायात र सञ्चार
(ख) आर्थिक व्यवस्थाका विशेषताहरु
मिश्रित अर्थ व्यवस्था, साझा, योजनावद्ध विकास, कृषिजन्य अर्थ व्यवस्था

११. परराष्ट्र नीति (Foreign Policy)
(क) नेपाल असंलग्न परराष्ट्र नीतिको अर्थ
(ख) नेपालको परराष्ट्र नीतिका विशेषताहरु
(ग) नेपाल भारत सम्बन्ध
(घ) नेपाल चीन सम्बन्ध
(ङ) संयुक्त राष्ट्र संघ र नेपाल
(च) सार्क र नेपाल

१२. शासन र व्यवस्था (Rulling System)
(क) व्यवस्थापिका
(ख) कार्यपालिका
(ग) न्यायपालिका
(घ) संविधान
(ङ) नेपाल अधिराज्यको संविधान र यसका विशेषताहरु
(च) विकेन्द्रीकरण, महत्व, आवश्यकता र विशेषताहरु

१३. जनसंख्या शिक्षा (Population Education)

(क) जनसंख्या शिक्षाको परिचय र विषयवस्तु

(ख) जनसंख्या शिक्षँकको उद्देश्यहरु

(ग) जनसंख्याको आकार, संरचना, वितरण, वृद्धि, प्रभाव र नियन्त्रण

सन्दर्भ सामग्रीः

१. आधारभूत समाजशास्त्र तथा मानवशास्त्र, कमलराज शर्मा, देवी शर्मा, पोखरा ।

२. अर्थशास्त्रका तत्वहरू, सावित्री श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं, दोश्रो संस्करण ।

३. अर्थशास्त्रका सरल सिद्धान्त, ईश्वरमान श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं ।

४. अर्थशास्त्र, मुरारीमोहन जोशी, कृष्णदेव यादव, नेशनल बुक सेण्टर, काठमाडौं ।

५. महत्वपूर्ण राजनीतिक शब्दज्ञान, सिद्धिश्वरमान श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौ, ंनवौं संस्करण २०६३ ।

६. मुद्रा, बैङ्किङ्ग, राजश्व, अन्तरराष्ट्रिय व्यापार तथा नेपालको अर्थशास्त्र, प्रा.महेश्वरमान श्रेष्ठ, रत्न पुस्तक भण्डार, काठमाडौं ।

७. नेपाल परिचय, सावित्री श्रेष्ठ, सिद्धिश्वरमान श्रेष्ठ, निरन्तर प्रकाशन, काठमाडौं, तेस्रो संस्करण ।

८. राजनीति शास्त्रको परिचय सिद्धिश्वरमान श्रेष्ठ, निरन्तर प्रकाशन, काठमाडौं, दोस्रो संस्करण ।

९. सामाजिक अभियान, प्रा.राजेन्द्रप्रसाद अधिकारी, सह-प्राध्यापक सिद्धिश्वरमान श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं तेश्रो संस्करण, २०६३ ।

Statistics and Probability

EG 2207 SH

Total: 4 hour /week

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

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

Practical : hours/week

Course Description:

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

Course Objectives:

After completing this course the students will be able to:

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

Course Contents:

Unit 1. Introduction: [4]

- 1.1 Origin and Definition of Statistics
- 1.2 Importance and Scope of Statistics
- 1.3 Limitation of statistics

Unit 2. Basic concept of Statistical Studies: [6]

- 2.1 Data, type and Sources of data
- 2.2 Population and Sample
- 2.3 Variables and Parameter

Unit 3. Organizing a Raw Data: [6]

- 3.1 Classification of Data
- 3.2 Meaning and Importance of table
- 3.3 Parts of Table

Unit 4. Pictorial Representation of a Data Set: [5]

- 4.1 Introduction
- 4.2 Difference between Diagram and Graphs
- 4.3 Bar diagram, Histogram, Pie diagram, Steam leaf display
- 4.4 Graphical Representation of Data
- 4.5 Limitation of Diagram and Graphs

Unit 5. Summarizing a Data set: [8]

- 5.1 Introduction
- 5.2 Central Tendency (mean, median, and mode)
- 5.3 Variability of Dispersion (range, inter quartile range, and standard deviation

Unit 6. Concepts of Probability: [8]

- 6.1 Introduction of probability
- 6.2 Definition of probability
- 6.3 Basic terms of probability theory
- 6.4 Counting rule (permutation and combination)
- 6.5 Additative and multiplicative law of probability

Unit 7. Theatrical probability distribution: **[4]**

Random variables
Binomial distribution
Poisson distribution
Normal Distribution

Unit 8. Bivariate data analysis: **[4]**

8.1 Introduction
8.2 Correlation (Karl Pearson's Coefficient of Correlation)
8.3 Linear regression

References books:

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

Third Year
(Fifth and Sixth Semesters)

Fifth Semester

Subjects:

1	EG 3101 CT	Computer Networks
2	EG 3102 CT	Management Information System (MIS)
3	EG 3103 CT	Embedded System
4	EG 3104 CT	Computer Graphics
5	EG 3105 CT	Applied Operating System
6	EG 3106 SH	Technical English
7	EG 3107 CT	Elective – I
		(a) Geographical Information System
		(b) Computer Simulation and Modeling
		(c) Image Processing
		(d) Distributed System
8	EG 3108 CT	Minor Project

Computer Networks

EG 3101 CT

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

Course Description:

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

Course Objectives:

After completing this course the students will be able to:

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

Course Contents:

Unit 1. Introduction to computer network: [2]

- 1.1. Introduction, definition, features, issues
- 1.2. Applications of computer networks

Unit 2. Network architecture: [6]

- 2.1. Network topologies
- 2.2. Network types: LAN, MAN, WAN
- 2.3. Layered network architecture, protocols, interfaces, services
- 2.4. OSI Reference model
- 2.5. TCP/IP Reference model
- 2.6. Standardization organizations

Unit 3. Network hardware and software: [3]

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

Unit 4. Physical layer: [5]

- 4.1. Digital signals, line coding formats
- 4.2. Transmission impairment: attenuation, distortion, noise, interference
- 4.3. Channel bandwidth and throughput; propagation time, transmission time
- 4.4. Transmission media
  - Guided: coaxial, twisted-pair, fiber-optic
  - Unguided: radio, microwaves, infrared

Unit 5. Data link layer: [5]

- 5.1. Introduction to data link layer and its issues
- 5.2. Flow control at data link layer
- 5.3. Error control issues at data link layer
- 5.4. Data link layer protocols: HDLC, PPP

Unit 6. LAN architecture/standards: [5]

- 6.1. Introduction to LAN standards and architecture

6.2. Media access control, MAC address
6.3. CSMA/CD, Token ring, Token bus and IEEE 802.3, 802.4, 802.5
6.4. Introduction to wireless LAN, Bluetooth, Wi-Fi, Wi-Max

Unit 7. Network Layer: [8]

7.1. Internetworking
7.2. Switching: Circuit switching and packet switching
7.3. Addressing issues at network layer
7.4. IP address; Different classes; Private and Public address
7.5. Subnet mask and Subnetting; Classless addressing; Network address translation (NAT)
7.6. Routing and its necessity; static and dynamic routing; interior and exterior routing
7.7. Introduction to dynamic routing protocols: RIP. IGRP, OSPF
7.8. Network layer protocols: ARP, RARP, IP, ICMP
7.9. Introduction to IPv6 and its necessity

Unit 8. Transport layer: [4]

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

Unit 9. Application Layer: [4]

9.1. Application layer and its function
9.2. Electronic mail: SMTP
9.3. File transfer: FTP
9.4. Dynamic host configuration protocol (DHCP)
9.5. DNS, HTTP, WWW

Unit 10. Network security: [3]

10.1. Cryptography, Digital signature
10.2. Firewalls
10.3. Virtual private network

Practical: [45]

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

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

10. Configure HTTP, FTP, DHCP server and verify it
11. Configuration of DNS and e-mail server
12. Design of local area network (LAN)
13. Case study: Organizational visit to study existing network system

References books:

1. "Computer Networks", A. S. Tanenbaum
2. "Data Communications and Networking", Behrouz A. Forouzan

Management Information System (MIS)

EG 3102 CT

Total: 5 hours /week

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

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

Practical : 2 hours/week

Course Description:

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

Course Objectives:

After completing this course the students will be able to:

1. understand information systems
2. plan information systems
3. manage information systems
4. Discuss on specific modern trends like ERP, DSS and EMS.

Course Contents:

Unit 1. Introduction to Management Information System [3]

1.1 MIS: Concept and definition, Role of MIS, Impact of MIS, Management as a control system, MIS support for management, Management effectiveness and MIS, Organization as a system

Unit 2. Strategic Management of Business [4]

2.1 Corporate planning, Strategic planning, Development of the business strategies, Types of strategies, Short –range planning, tools of planning, Strategic analysis of business, MIS for strategic business planning

Unit 3. Information security challenges in e-Enterprises [4]

3.1 Security threats and vulnerability, controlling security threat and Vulnerability, management security threat in e-Business, disaster management, MIS and Security Challenges

Unit 4. Information Technology Impact on society [3]

4.1 Impact of IT on Privacy, Ethics, Technical solutions for Privacy Protection, Intellectual property, copyright and patterns, Impact of IT on the workplace, Information system quality and impact, impact on quality of life

Unit 5. Decision making [4]

5.1 Decision making concept and process, decision analysis by analytical modeling, behavioural concept in decision making, MIS and Decision making

Unit 6. Information and Knowledge [4]

6.1 Classification of the Information, methods of data and Information Collection, value of Information, General Model of Human as an Information Processor, Knowledge

Unit 7. Development of MIS [4]

7.1 Development of Long range plan of the MIS, ascertaining the class of Information, Determining the Information Requirement, Development and Implementation of MIS, Management of Information quality in the MIS, organization for development of MIS, development process model of MIS

Unit 8. Applications of MIS [5]

8.1 Applications of MIS in Manufacturing sector and service sector, Personnel management, Financial management ,Production Management, Service concept , customer service design, Service management system.

Unit 9. Decision support systems and Knowledge Management [4]

9.1 DSS concept and philosophy, Group DSS, DSS application in e-Enterprise, Knowledge Management, Knowledge Management system, Knowledge based Expert System , MIS and the benefits of DSS

Unit 10. Enterprise Management Systems [4]

10.1 Enterprise Resource Planning(ERP) system, ERP Model and modules, Benefits of the ERP, ERP Product evaluation, ERP implementation, Supply Chain management(SCM), Information management in SCM, Customer Relational management (CRM), EMS and MIS

Unit 11. Technology of Information systems [4]

11.1 Data processing, Transaction processing, application processing, Information system processing, TQM of Information system, Human factors and User Interface, Real time system, Case tools, strategic nature of IT decision, Evaluation and Feasibility of IT Solutions,

Unit 12. Communication networks and Client server architecture [4]

12.1 Network topology, Features of Network, Data communication, Examples of network applications, Client server architecture, Client server Implementation strategies

Unit 13. Data Warehouse [4]

13.1 Data in Data Warehouse, Architecture of Data Warehouse, Data Warehouse design, Organization and management of Data Warehouse, Implementation of Data Warehouse, Business Intelligence, Data Warehouse and MIS.

Practical: **[30]**

The practical should contain all features mentioned above.

References:

1. Management Information Systems, Waman S Jawadekar
2. Management Information Systems: Managing the Digital Firm (9th Edition) by Kenneth C. Laudon, Jane P. Laudon .
3. Essential of Management Information Systems by Laudson
4. Computer Engineering for Management by Efraim Turban

Embedded System
EG 3103 CT

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

Course Description:
This course gives the fundamental knowledge of embedded system incorporating hardware, interrupts, real-time operating system and its design, embedded software development tools, debugging techniques and examples of practical embedded system

Course Objectives
After the Completion of this course students will be able to
1. Understand basic of the embedded system
2. Implementation of embedded system for practical use

Course Content:

1. Introduction (12 hrs)
- 1.1 A first look at embedded system
- 1.2 Hardware fundamental for the software engineer
- 1.3 Microprocessors
- 1.4 Buses
- 1.5 Direct memory access
- 1.6 Interrupts
- 1.7 Other common parts
- 1.8 Built-ins on the microprocessor
- 1.9 Conventions used on schematics and sample

2. Interrupts (6 hrs)
- 2.1 Microprocessor architecture
- 2.2 Interrupt basics
- 2.3 Shared data problem
- 2.4 Interrupt latency

3. Survey of software architectures (5 hrs)
- 3.1 Round-Robin
- 3.2 Round-Robin with interrupts
- 3.3 Function-queue-scheduling architecture
- 3.4 Real-time operating system architecture
- 3.5 Selection of architecture

4. Real-time operating systems and services (6 hrs)

4.1 Tasks and task states
4.2 Task and data
4.3 Semaphores and shared data
4.4 Messages, queues, mailboxes, and pipes
4.5 Timer functions
4.6 Events
4.7 Memory management
4.8 Interrupt routines in an RTOS environment

5. Design using real-time operating system (5 hrs)

5.1 Overview, principle and example
5.2 Encapsulating semaphores and queues
5.3 Hard real-time scheduling considerations
5.4 Saving memory and power

6. Embedded software development tools (4 hrs)

6.1 Host and target machines
6.2 Linker/locators for embedded software
6.3 Embedded software into the target system

7. Debugging techniques and examples (7 hrs)

7.1 Testing on the host machine
7.2 Instruction set simulators
7.3 The assert macro
7.4 Using laboratory tools
7.5 Example

Practical: (45)

Practical will be covering all the chapters mentioned above.

Text Book

2. David E. Simon, *"An Embedded Software Primer"*, Pearson Education Asia, 2008

Computer Graphics

EG 3104 CT

Total: 6 hour /week

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

Tutorial: hours/week

Part: I **Practical: 3 hours/week**

Course Description

This course gives the fundamental knowledge of computer graphics, and familiarize with hardware involved in graphics, algorithms to generate two-dimensional and three-dimensional graphical objects and animations.

Course Objectives:

After the Completion of this course students will be able to

1. Understand the fundamental of graphics hardware
2. Develop program for 2D and 3D transformation
3. Understand and implement shading models

Course Content:

1. Introduction (4 hrs)

- 1.1 Introduction and history of computer graphics
- 1.2 Applications of computer graphics
- 1.3 Application in the CAD and CAM

2. Two-dimensional Graphics (7 hrs)

- 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

3. Three-dimensional Graphics (12 hrs)

- 3.1 Projection of 3D objects onto 2D display devices
- 3.2 Parallel and perspective projection
- 3.3 3 D transformations – translation, rotation, scaling, refection
- 3.4 Methods of 3D object representation – polygon tables and polygon surfaces
- 3.5 Introduction to hidden lien and surface detection techniques
- 3.6 Introduction to lighting models
- 3.7 Introduction to shading models – constant shading, Gouraud shading and Phong shading

4. Graphics Hardware (7 hrs)

- 4.1 Input hardware – mouse, keyboard, light pen, touch screen, tablets, scanner
- 4.2 Output hardware – monitors, plotters, printers
- 4.3 Raster and vector display technology- principles and characteristics
- 4.4 Raster display – cathode ray tube and color production techniques
- 4.5 Principle and operation of LCD monitor

5. Fundamentals of Animation Techniques (4 hrs)

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

6 Graphical User Interface Design (3 hrs)

6.1 Need and application of GUI

6.2 Windows, icons, menu and other graphical interface items

6.3 Principles of interactive user dialogs – managing skill levels, consistency, loading off memory, error handling, continuous feedback, default values, use of metaphors, color blindness

7. Web Graphics Design (4 hrs)

7.1 Introduction to graphics file formats

7.2 Principles of web graphics design – browser safe colors, size, resolution, background, anti-aliasing

8 Introduction to Graphics Design Packages (4 hrs)

8.1 Need of machine independent graphic packages

8.2 Type and purposes of graphics packages

8.3 Desirable features of a graphics design package

8.4 Examples of graphics packages and libraries

Practical: (45)

Practical will be covering all the chapters mentioned above. Students should develop a project based on following:

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

Text Book:

1. James Foley, Andries van Dam, Steven Feiner, John Hughes, "Compute Graphics – Principles and Practice", Second Edition in C, Addison Wesley Publishing, 2007

2. D. Hearn M. P. Baker, "Computer Graphics – C version", Second Edition, Prentice – Hall International, Inc., 2008

Applied Operating Systems
EG 3105 CT

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

Course Description:

To introduce the fundamentals of computer operating systems as features of operating systems, function, application and how they are designed and constructed. Applied operating system discuss in details how to apply the OS principles rather than only theories. This course covers from history, OS types to the new principles and implementations.

Course Objectives:

1. provide the basics concept of instructions implementation.
2. provide the details ideas of graphical user interface and command user interface.
3. familiarize with the feature controlling of modern operating system.
4. defining how operating system acts as resource manager and virtual machine.

Course Contents:

Unit 1: Operating Systems [7 Hrs]

1.1 Introduction: Processes, task, files, shell, system calls, OS and Applied OS;
1.2 OS as virtual machine and Resource manager;
1.3 Type of OS: Batch systems, Time-sharing systems, Personal-computer systems, Parallel systems, Real-time systems, Distributed systems;
1.4 Operating-system structures;
1.5 System components, OS services, System programs;
1.6 System structure: Monolithic systems, Layered, Virtual Machines, Client-Server;
1.7 Java, System design and implementation; System generation.

Unit 2: Process Management [15 Hrs]

2.1 Processes**:**
- Definition of Process, Process states and transition, PCB (Process Control Block);
- Concurrent Process: Introduction, Parallel Processing, IPC(Inter-Process Communication), Critical Regions and conditions, Mutual Exclusion;
- Mutual Exclusion Primitives and Implementation, Dekker's Algorithm, Peterson's Algorithm,
- Threads: Overview, Benefits of threads, User and Kernel Threads, Multithreading Models. Threads in Java.

2.2 Processor Scheduling:
- Concepts, Scheduling Criteria;
- Scheduling Algorithms: FCFS, SJF, Round Robin and Priority;
- Thread Scheduling;

2.3 Process Synchronization:

- Background, Critical-Section Problem;
- Two-Tasks Solutions, Synchronization Hardware, Semaphores;
- Classical Synchronization,
- Java Synchronization, OS Synchronization.

2.4 Deadlocks:

- Deadlock and Indefinite Postponement: Introduction, Preemptable and Nonpreemptable Resources, Conditions for deadlock;
- deadlock modeling, deadlock prevention, deadlock avoidance;
- deadlock detection and recovery, Starvation

Unit 3: Memory Management [10 Hrs]

3.1 Introduction**:**

- Storage organization and hierarchy, contiguous versus noncontiguous storage allocation,
- logical and physical memory, fragmentation, fixed partition multiprogramming, variable partition multiprogramming,
- relocation and protection, Coalescing and Compaction,

3.2 Virtual Memory:

- Introduction, Paging, Page tables, Block mapping, Direct mapping,
- TLB (Translation Look aside Buffers); Page Fault,
- Page Replacement algorithms, Optimal Page Replacement algorithm, Not Recently Used Page Replacement algorithm, First-In-First-Out algorithm, Second Chance Page Replacement algorithm, Least Recently Used Replacement algorithm, Clock Page Replacement algorithm, Working Set Page Replacement algorithm, WS Clock Page Replacement algorithm,
- Segmentation, implementation of pure segmentation,
- Segmentation with Paging,
- Thrashing, Memory wall

3.3 File Systems:

- Concept, File Access Methods, Directory Structure, Protection,
- File-System Structure, Methods of Allocation, Free-Space Management, Directory Implementation,
- Efficiency and Performance of File Systems, Recovery.

Unit 4: I/O Management [7 Hrs]

I/O Sub-Systems:

- Concept, Application I/O Interface, Kernel I/O Subsystem, I/O Requests Handling, Performance;
- Mass-Storage Device: Structure, Disk Structure, Disk Scheduling, Disk Management,
- Swap-Space Management, Stable-Storage Implementation, Tertiary-Storage Structure.

Unit 5: Case Studies [6 Hrs]

5.1 DOS Operating System: System configurations, Filing and disk management, Graphical capabilities, Memory management.

5.2 Unix/Linux Operating System: File systems and disk management, Filters, Pipelining, Sockets, Shell, Memory management, Networking feature, multiprocessing feature.

5.3 Window 2000: File System and disk management, Networking, Security.

Practical: (45)

There shall be the 15 laboratories works which covers the principles of operating systems principles and constructs, normally outline on the principles of open source:

1. Internal and External MS DOS Commands
2. Installation of Linux and Windows operating systems on various methods.
3. Basic commands and principles of networking among the personal computers by using Windows, Linux.
4. Implementation of inter-process communication by using any high level programming language using C.
5. Implementation of scheduling algorithms by using C and Java.
6. Memory and I/O management in DOS and Windows
7. Shell management in Linux and shell programming
8. Memory management in Linux.

Text Book:

1. Silberschatz, A., Galvin, P.B., Gagne, G., *Applied Operating Systems Concepts*, 1st Edn., John Wiley & Sons, 2000, ISBN: 9971-51-284-X

Reference Book:

1. Silberschatz, A., Galvin, P.B., *Operating Systems Concepts*, 5th Edn., John Wiley & Sons, 1999, ISBN: 9971-51-275-0

Technical English
EG 3106 SH

Total: 2 hour /week
Year: III **Lecture: 2 hours/week**
Semester: I **Tutorial: hours/week**
Practical : hours/week

Course Description:

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

Course Objectives:

After completing this course the students will be able to

1. understand read, write, listen English well
2. present technical writing in their own way
3. get acquaintance with some of the required words, Antonyms and synonyms

Course Contents:

Unit 1. Reading Passage: [8]

- 1.1 Predicting Content
- 1.2 Skim
- 1.3 Summary
- 1.4 Note making

Unit 2. Writing: [10]

- 2.1 paragraph writing
- 2.2 Letter writing
  - Letter to the editor
  - Leave letter
- 2.3 Writing simple technical reports

Unit 3. Listening: [4]

- 3.1 Synonyms and antonyms
- 3.2 Word formation
- 3.3 Fill in the blanks
- 3.4 American English/British English

Unit 4. Focus on language: [5]

- 4.1 Prepositions
- 4.2 Phrasal verbs
- 4.3 Note making
- 4.4 Cause and effect
- 4.5 purpose and function

Unit 5. Speaking: [3]

- 5.1 Different speech functions
- 5.2 Introducing a guest
- 5.3 Vote of thanks

References books:

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

(a) Geographical Information System

EG 3107 CT

Total: 7 hour /week

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

Semester: I **Tutorial: hours/week**

Practical: 3 hours/week

Course Description:

This course provides introduction and scope of GIS. The topics of this course are GIS data system, GIS analysis and Digital Elevation Model.

Course Objectives:

After completing this course the student will able to:

1. explain GIS, background, development and components of GIS
2. explain data capturing for GIS techniques and data bank management
3. analyze of various spatial and non-spatial data in GIS
4. explore Digital Elevation Model

Course Contents:

Unit 1. Introduction to Geographical Information System (GIS): [10]

1.1 Definition
- Objective of GIS
- Historical Background

1.2 Introduction to earth surface
- Longitude
- Latitude

1.3 Basic concept of spatial information

Unit 2. GIS Data System: [18]

2.1 Data structure
- Types of data structure
- Raster and Vector formats
- Advantages and disadvantages of various data structures

2.2 Data input
- Data pre-processing
- Methods of data capture

2.3 Digitization and scanning methods

2.4 Map projections

2.5 Ellipsoids

Unit 3. GIS Analysis: [16]

3.1 Handling digital Geographical Information Data

3.2 Analysis of single data planes in Raster format

3.3 Analysis of Multiple data planes in Raster format

3.4 Uses of topographic data in Raster format

3.5 Data structures for thematic maps

Unit 4. Digital Elevation Model (DEM): [16]

4.1 Introduction and need of DEM

4.2 Data sources and products of DEM

4.3 Digital Terrain Modeling (DTM)
4.4 Input verification
4.5 Storage and methods of data analysis for spatial modeling
4.6 Methods of GIS and Spatial interpolation

Practical: **[45]**

The practical should contain all features mentioned above.

Text books:

1. Jeffrey Star and John Estes, "Geographical Information System - An Introduction", Prentice Hall, 1990
2. Chestern, "Geo Informational Systems - Application of GIS and Related Spatial Information Technologies", ASTER Publication Co., 1992

References books:

1. Agarwal C.S., "Remote Sensing", Wheeler Publishing, 2000
2. Burrough,P.A., "Principles of GIS for Land Resources Assessment", Oxford Publication, 1980

(b) Computer Simulation and Modeling

EG 3107 CT

Total: 7 hour /week
Year: III **Lecture: 4 hours/week**
Semester: I **Tutorial: hours/week**
Practical: 3 hours/week

Course Description:

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

Course Objectives:

After completing this course the student will be able to:

1. learn how the choice of data structures and algorithm design methods impacts the performance of programs
2. implement ADTs such as stacks, queues, lists, trees, and algorithms such as searching, and sorting
3. gain experience writing programs in C/C++

Course Contents:

Unit 1. Introduction: [12]

1.1 System
- Definition
- System Environment
- Sub systems
- Events and activities
- Stochastic system

1.2 System Modeling

1.3 Definition of computer simulation

1.4 Importance of modeling and simulation
- Discrete and continuous system
- Types of Model
  - Static physical model
  - Static mathematical model
  - Dynamic physical model
  - Dynamic mathematical model

1.5 Steps in simulation study

Unit 2. Discrete and Continuous system: [12]

2.1 Queuing system
- Numerical computation technique for discrete models
- Discrete events and time representation
- Generation of arrival pattern

2.2 Differential and partial differential equations

2.3 Analog Computer and Simulation

2.4 Digital-Analog Simulator
2.5 Feedback Systems

Unit 3. System Simulation: [6]

3.1 Numerical Computation technique for Continuous Models
3.2 Numerical Computation technique for Discrete Models
3.3 Distributed Lag model

Unit 4. Random Number Generation: [10]

4.1 Properties of Random Number
4.2 Generation of Pseudo-Random Number
4.3 Techniques for generating Random Numbers
- Linear Congruential Methods
- Combined Linear Congruential Generation

4.4 Test for Random Number
- Test for Uniformity
  - Frequency Tests
- Run Tests
- Autocorrelation Test
- Gap Test
- Poker Test

Unit 5. Analysis of Simulation Output: [10]

5.1 Estimation Methods
- Nature of Problem
- Confidence Interval

5.2 Simulation Run Statistics
5.3 Replication of Runs
- Mean waiting time
- Mean inter-arrival time

5.4 Estimation of Internal Bias

Unit 6. General Purpose System Simulation (GPSS): [10]

6.1 GPSS Programs
6.2 GPSS blocks
6.3 Action Times
6.4 Succession of Events
6.5 Facilities and Storage
6.6 Applications
- Manufacturing shop
- Simulation of Supermarket

Practical: [45]

The practical should contain all features mentioned above.

References books:

1. G. Gorden, “System Simulation” , Second Edition, Prentice Hall India
2. Jerry Banks, John S, Barry L, David M, “Discrete-Event System Simulation” Third Edition, Prentice Hall India

(C) Image Processing

EG 3107 CT

Total: 7 hour /week
Year: III **Lecture: 4 hours/week**
Semester: I **Tutorial: hours/week**
Practical: 3 hours/week

Course Description:

This course is an introduction to Image processing. It covers topics to understand the image processing theory and techniques.

Course Objectives:

After completing this course the student will able to:

1. explain the fundamental aspects of image processing
2. explain the digital image properties
3. explain the pre image processing technique
4. explain image data compression

Course Contents:

Unit 1. Fundamental of image processing system: [14]

1.1 Introduction
- Human image perception process
- Structure of Human Eye
- Light and color spectrum
- Visual characteristic of color, Hue , brightness and Value

1.2 Image digitization
- Sampling
- Quantization
- Neighbors of a pixel
- Distance measure
- Color images

1.3 Types of images
- Photographic films
- Film characteristics
- Video images
- CCD cameras and CMOS sensors
- CRT and LCD monitors

Unit 2. Image enhancement: [12]

Definition
- Spatial domain methods
- Frequency domain methods

Histogram modification technique
- Neighborhood averaging
- Media filtering
- Low pass filtering
- Averaging of multiple images
- Image sharpening by differentiation and high pass filtering.

Image transform

- Introduction to Fourier transform
- Properties of two dimensional FT

Unit 3. Image restoration: [10]

3.1 Definition
- Degradation model
- Discrete formulation
- Circulant matrices
- Block circulant matrices
- Effect of diagnolization of circulant and block matrices

3.2 Unconstrained and constrained restorations
- Inverse filtering
- Restoration in spatial domain

Unit 4. Image encoding: [12]

4.1 Objective and subjective fidelity criteria
- Basic encoding process
- The mapping
- The quantizer
- The coder differential encoding
- Contour encoding
- Image encoding relative to fidelity criterion

4.2 Image Data Compression
- Image data properties
- Predictive compression methods
- JPEG and MPEG compression methods

Unit 5. Image analysis: [12]

5.1 Image analysis techniques
- Spatial feature extraction
- Amplitude and Histogram features
- Transform features
- Edge detection

5.2 Gradient operators
- Boundary extraction
- Edge linking
- Boundary representation
- Boundary matching
- Shape representation.

Practical: [45]

The practical should contain all features mentioned above.

Text books:

1. Rafael, C. Gonzalez., and Paul, Wintz. "Digital Image Processing ", Addison - Wesley Publishing Company, 1987
2. William, K.Pratt., "Digital Image Processing "John Wiley and Sons , 1978.

Reference books:

1. Rosenfeld, and Kak , A.C., " Digital Image Processing " Academic press, 1979.
2. Anil.K.Jain.,"Fundamentals of Digital Image Processing".PHI, 1995

(d) Distributed Processing

EG 3107 CT

Total: 7 hour /week

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

Semester: I **Tutorial: hours/week**

Practical: 3 hours/week

Course Description:

This course is an introduction to distributed processing. It covers topics to understand the interaction between hardware and software parts as well as benefits and challenging aspects of parallelism and distributed system (architecture).

Course Objectives:

After completing this course the student will able to:

1. explain the fundamental aspects of parallel and distributed processing
2. explain the taxonomies of parallel systems
3. explain the performance measures for parallel systems
4. write efficient parallel application programs
5. explain fundamental of distributed system

Course Contents:

Unit 1. Fundamental of distributed System: [15]

1.1 Introduction
- History of computer
- Parallel Computer structure
- Motivation of parallelism
- Moore’s law
- Grand challenge problems

1.2 Parallel and Distributed Computers
- Flynn's Taxonomy
- Distributed Memory Multi-computers
- Shared Memory Multi-processors
- Networks of Workstations
- Cluster and Grid Computing

1.3 Message Passing Computing
- Process Creation
- Message Passing Routines
- Point-to-Point and Collective Communication

1.4 Performance Measures
- Granularity
- Speed Up and Efficiency
- Amdahl's Law
- Gustafson's Law and Iso-efficiency

Unit 2. Parallel Programming Techniques: [15]

2.1 Simple Data Partitioning
- Sum of Numbers
- Bucket Sort

- Numerical Integration

2.2 Divide-and-Conquer
- Merge sort
- Adaptive Quadrature
- Barnes-Hut Algorithm

2.3 Scheduling and Load Balancing
- List Scheduling
- Static Load Balancing
- Dynamic Load Balancing

2.4 Synchronous Computations
- Data Parallel Programming
- Global and Local Synchronization
- Solving Linear Equations
- Cellular Automata

Unit 3. Algorithms and Applications: [12]

3.1 Introduction:
- Algorithms and Applications

3.2 Sorting Algorithms:
- Rank Sort
- Compare and Exchange
- Bubble Sort
- Bitonic Mergesort.

3.3 Numerical Algorithms:
- Matrix Algorithms

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

Unit 4. Synchronization/communication in distributed memory: [6]

4.1 Send/receive (blocking vs. non-blocking):
- CSP
- Hardware Algorithm
- Addition and Subtraction with Signed-2's Complement

Unit 5. Pipeline, vector processing and multiprocessors: [12]

5.1 Parallel Processing
- Pipelining-Arithmetic
- Pipeline-Instruction

5.2 Pipeline Examples
- Four Segment Instruction Pipeline-
- Data Dependency
- Handling of Branch Instructions.
- RISC Pipeline
- Three Segment Instruction

- Delayed load-Delayed branch.

5.3 Vector Processing:

- Vector operations-
- Matrix Multiplication-
- Memory Interleaving-
- Supercomputers array processors:
- Attached Array Processor-SIMD Array processor.

Practical: **[45]**

The practical should contain all features mentioned above.

Text Books:

1. Barry Wilkinson and Michael Allen. Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers (2nd Edition), Prentice Hall PTR (2005)

References books:

1. A. Grama, A. Gupta, G. Karypis and V. Kumar. Introduction to Parallel Computing (2nd edition), Addison Wesley (2002).
2. I. Foster. Designing and Building Parallel Programs, Addison Wesley (1995).

Minor Project

EG 3108 EX

Total: 2 hour /week
Year: III **Lecture: hours/week**
Semester: I **Tutorial: hours/week**
Practical: 2 hours/week

Course description:

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

Minor Project:

- Preliminary selection of topic
- Discussion with department regarding the practically of the project (e.g. cost, usefulness, market)
- Finalization of topic
- Submission of the detail proposal (Extensive literature review including survey)
- 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 3202 CT E-commerce
3. EG 3203 CT Artificial Intelligence
4. EG 3204 CT Elective – II
   - **(e) Data Mining and Data Warehousing**
   - **(f) Internet /Intranet**
   - **(g) Advanced Computer Architecture**
   - **(h) Enterprise Resource Planning**
   - **(i) Business Information System (BIS)**
   - **(j) Decision Support System**
   - **(k) Telecommunication**
   - **(l) Distributed Operating System**
5. EG 3205 CT Object Oriented Analysis & Design (OOAD)
6. EG 3206 CT Major Project

Multimedia Technology

EG 3201 CT

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

Course Description:

The main objective of this course covering three main domains of Multimedia Systems: Devices, Systems and applications

Course Objectives:

After completing this course the students will be able to:

1. understand basics of audiovisual properties
2. understand communication, synchronization of audio video system

Course Contents:

Unit 1. Introduction: [4]

What is Multimedia? Multimedia and Personalized Computing, Multimedia on the MAP, Medium, Multimedia system and properties, Data Streams Characteristics, Data Stream Characteristics for Continuous Media, Information Units

Unit 2. Sound / Audio System: [3]

Concepts of sound system, Music and speech, Speech Generation, Speech Analysis, Speech Transmission

Unit 3. Images and Graphics: [4]

Digital Image Representation, Image and graphics Format, Image Synthesis, Analysis and Transmission

Unit 4. Video and Animation: [4]

Video signal representation, Computer Video Format, Television, Computer- Based animation, Animation Language, Methods of controlling Animation, Display of Animation, Transmission of Animation

Unit 5. Data Compression: [4]

Storage Space, Coding Requirements, Source, Entropy and Hybrid Coding, JPEG, Lossy Sequential DCT- based Mode, Expanded Lossy DCT-based Mode, Hierarchical mode, MPEG, Video and Audio Encoding, DVI, Audio and still Image Encoding

Unit 6. Communication Systems in Multimedia: [4]

Application Subsystem, Transport subsystem, Quality of service and resource management, Trends in collaborative Computing, Trends in Transport Systems, Multimedia Database Management System

Unit 7. Documents, Hypertext and MHEG (Multimedia and Hypermedia Information Coding Expert Group): [5]

Documents, Hypertext and Hypermedia, Document Architecture SGML(standard generalized markup language), Document Architecture ODA, MHEG

Unit 8. User Interfaces: [4]

Basic Design Issues, Video and Audio at the User Interface, User- friendliness as the Primary Goal

Unit 9. Synchronization: [4]

Notation of Synchronization, Presentation Requirements, Model for Multimedia Synchronization, Specification of Synchronization

Unit 10. Abstractions for programming: [4]

Abstractions Levels, Libraries, System Software, Toolkits, Higher Programming Languages, Object –oriented approaches

Unit 11. Multimedia application: [5]

Program and Structure, Media Preparation, Media Composition, Media Integration, Media Communication, Media Consumption, Media Entertainment, Trends in multimedia applications

Practical: [45]

There shall be application lab exercises covering all features of multimedia system

References books:

1. Multimedia: Computing, Communications and Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education Asia
2. Multimedia Communications, Applications, Networks, Protocols and Standards, Fred Halsall, Pearson Education Asia
3. Multimedia Systems, John F. Koegel Buford, Pearson Education Asia

E-Commerce

EG 3202 CT

Total: 6 hour /week

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

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

Practical: 2 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

1. Understand the e-commerce, security issues of e-Commerce, types of payment system, payment gateway, legal and ethical issues of e-commerce, cyber law.

Course Contents:

Unit 1. Introduction: [5]

1.1 History of e-Commerce, how e-commerce works, e-Business, Categories of e-Commerce Applications, global trading environment & adoption of e-commerce, Differentiate between traditional and e-Commerce, advantages and disadvantages of e-Commerce

Unit 2. Business Models of e-Commerce [5]

2.1 Major challenges of B2B e-Commerce, Business to Business (B2B), development of B2B e-Commerce, types of B2B market, the e Hub concept, difference between B2C and B2B e-Commerce, C2C or P2P, C2B, B2G, e-Procurement

Unit 3. B2B e-Commerce and EDI [5]

3.1 Electronic Data Interchange(EDI), components of EDI, protocol, EDI standards, Data standards used in EDI, Electronic funds transfer, e-Marketing, ad network, XML and its applications

Unit 4. Mobile Commerce [4]

4.1 Application of M-commerce, advantage of m-commerce, wireless application protocol, WAP Browser, Mobile Commerce architecture

Unit 5. Technology for Online business [4]

5.1 IT Infrastructure, Internet, Intranet, Extranet, VPN, Firewall, Cryptography, Digital signature, Digital certificate, Hypertext, Hypermedia, HTTP

Unit 6. Electronic payment system (EPS) [5]

6.1 Online banking, types of EPS, security requirement of EPS, Secure socket layer (SSL), secure electronic transaction (SET), payment gateway, online payment processing, and payment processing Network

Unit 7. Security Issues in e-Commerce [5]

7.1 e-Commerce Security Issues, Risks Involved in e-Commerce, protecting e-Commerce System, e-Commerce Security tools, biometric, Client server Network security, data and message security

Unit 8. Legal and Ethical Issues [3]

8.1 Issues related to e-Commerce, Legal issues, ethical issues, taxation

Unit 9. Cyber law [5]

9.1 Aims of cyber law, salient provisions of cyber law, Contracting and contract enforcement

Unit 10. Introduction to Entrepreneurship [4]

10.1 Entrepreneurship development, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, attributes and characteristics of a successful Entrepreneur, Entrepreneurial Culture

Practical:

The laboratory exercises should cover all the features mentioned above.

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

Artificial Intelligence

EG 3203 CT

Total: 8 hour /week

Year: III **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 hours/week**
Practical: 3 hours/week

Course Description:

This course deals with basics of artificial intelligence, knowledge representation, inference and reasoning, machine learning and applications of artificial intelligence.

Course Objectives:

After completing this course the student will able:

1. provide basic knowledge of Artificial Intelligence
2. proved the knowledge of Machine Learning, Natural Language, Expert Systems and Neural Network

Course Contents:

Unit 1. Goals in problem-solving: [7]

1.1 Goal schemas, use in planning, Concept of non-linear planning, Means–end analysis, Production rules systems, forward and backward chaining, Mycin-style probabilities and its application

Unit 2. Intelligence: [6]

2.1 Introduction of intelligence, Modeling, humans vs. engineering performance, Representing intelligence using and acquiring knowledge

Unit 3. Knowledge Representation: [7]

3.1 Logic, Semantic networks, Predicate calculus, Frames

Unit 4. Inference and Reasoning: [10]

4.1 Inference, theorems, Deduction and truth, maintenance, Heuristic search, State-space representations, game playing. Reasoning about uncertainty Probability, Bayesian networks, Case-based Reasoning

Unit 5. Machine Learning: [10]

5.1 Concepts of learning (based on Winston), Learning by analogy, Inductive bias learning, Neural networks, Genetic algorithms, Explanation based learning, Boltzmann Machines

Unit 6. Application of artificial intelligence: [20]

6.1 Neural networks: Network Structure, Adaline, Madaline, Perceptron, Multi-layer Perceptron, Radial Basis Function, Hopfield network, Kohonen Network, Elastic net model, back-propagation

6.2 Expert Systems: Architecture of an expert systems, Knowledge acquisition, induction, Knowledge representation, Declarative knowledge, Procedural knowledge, Knowledge elicitation techniques, Intelligent editing programs, Development of expert systems

6.3 Natural language Processing: Levels of analysis: Phonetic, syntactic, semantic, pragmatic, Machine Vision: Bottom-up approach, edge extraction, line

detection, line labeling, shape recognition, image interpretation, need for top-down, hypothesis-driven approaches.

Practical: **[45]**

1 Laboratory exercises should cover the design and development of artificial intelligence using the LISP and Prolog software.

2 Laboratory exercises must be designed to develop Search, Inference including forward and backward chaining in Object-Oriented Language, Design and implementation of Artificial Neural Networks

References books:

1. E. Rich & K. Knight, "*Artificial Intelligence"*, McGraw-Hill, 1991
2. Haykin "Neural Networks: *A Comprehensive Fundamentals"*, Macmillan, 1994
3. E. Turban, "*Decision Support and Expert Systems"* , Macmillan, 1993
4. R. Shingal, "*Formal Concepts in Artificial Intelligence"* , Chapman & Hall, 1992
5. G. Gazadar & C. Mellish, "*Natural Language Processing in Prolog: and introduction to computational linguistics"*, Addison-Wesley, 1989
6. D. Crookes, "*Introduction to Programming in Prolog"*, Prentice Hall, 1988.
7. P. H. Winston, "*Artificial Intelligence "*, Addison-Wesley, 1984
8. Beale & Jackson "*Neural Computing"* , Aam Higler, 1990
9. Hecht-Neilson "*Neurocomputing"*, Addison-Wesley, 1990
10. G. F. Luger & W. A Stubblefield, "*Artificial Intelligence"* , Benjamin Cummings, 1993
11. James A. Freeman, David M. Skapura, "Neural Networks: Algorithms, Applications, and Programming Techniques", Pearson Education Asia, 2001

(e) Data Mining & Data Warehousing

EG 3204 CT

Total: 8 hour /week

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

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

Practical: 3 hours/week

Course Description:

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

Course Objectives:

After completing this course the student will able to:

1. explain the basic aspects of data mining and decision support fundamentals and techniques
2. explain the data collection, cleaning, and aggregation issues
3. utilize a data mining query language
4. utilize statistical techniques for analyzing data

Course Contents:

Unit 1. An Overview of Database Systems: [10]

1.1 Review of traditional processing & its limitations
- Evolution of Database systems
- Database Applications & users
- Main characteristics of the Database approach

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

Unit 2. Data warehousing: [14]

2.1 Data warehouse design
- Definition
- star schemas
- fact tables
- dimensions
- dimension hierarchies
- Data mart

2.2 OLAP and Data mining
- Definition

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

Unit 3. Data warehouse construction: [10]

3.1 Introduction

3.2 Data extraction
- Data transformation

- Loading and refreshing.

Data warehouse support by Oracle

3.3 OLAP architectures

- SQL extensions for OLAP

Unit 4. Data mining models: [16]

4.1 Statistical Method

- Probability (averaging, mean square deviation)
- Maximum likely hood methods
- Baysaien

4.2 Decision tree

- Information gain
- Decision tree learning
- Classification

4.3 Neural network

- Supervised neural networks
- Perception
- Back

4.4 Cluster analysis

- k means
- Hierarchical clustering

Unit 5. Data mining applications: [10]

5.1 Techniques for mining large databases

- text mining
- web mining
- visual data mining

5.2 Data mining support in SQL Server

5.3 Oracle

5.4 Data mining standards

- Privacy and security issues.

Practical: [45]

The practical should contain all features mentioned above.

Text books:

1. J. Han, M Kamber, Data Mining Concepts and Techniques, Morgan Kaufmann, 2001, ISBN 1-55860-489-8.

Reference books:

1. Decision Support Systems and Intelligent Systems By Turban, E., et. al. (Prentice Hall)
2. I. Foster. Designing and Building Parallel Programs, Addison Wesley (1995),

(f) Internet/Intranet

EG 3204 CT

Total: 8 hour /week

Year: III **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 hours/week**
Practical: 3 hours/week

Course Description:

The purpose of this course is to provide the practical knowledge and skills to design and setup Internet and Intranet. The focus of the course is on the practical application of internetworking technologies to private Intranets for Information management and public Internets for electronic commerce. Students will learn theoretical details, strategies for designing sites, techniques for creating their technical infrastructures, methods for developing content, and techniques for site deployment and management. 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. understand basic principle of internet & intranet
2. understand basic features of application layer and transport layer protocols
3. understand security in computer net works
4. apply security in computer net works

Course Contents:

Unit 1. Introduction: [10]

1.1 History of Internet and Intranet
1.2 Growth of World Wide Web
1.3 Network Protocol
1.4 Overview of OSI and TCP/IP Model
1.5 A service Description
1.6 The Network Edge
- End Systems, Clients and Servers
- Connectionless and Connection oriented Services

1.7 The Network Core
- Circuit Switching ,packet switching and Virtual circuit switching

1.8 Delay and Loss in Packet-Switched Networks
1.9 Internet Access overview
- Residential Access
- Company Access
- Mobile Access

1.10 Physical Media
- Twisted Pair Copper Wire
- Coaxial Cable
- Fiber Optics
- Terrestrial Radio Channels
- Satellite Radio Channels

1.11 ISPs and Internet Backbones

- Tier 1 ISPs
- Tier 2 ISPs
- Tier 3 ISPs

Unit 2. Application Layer Protocol: [12]

2.1 Principles of Application layer protocols
2.2 Relationship Between Application layer and Transport
2.3 Client and Server Sides of an Application
2.4 Process Communicating Across a Network
2.5 Addressing Processes
2.6 User Agents
2.7 Application Layer Protocols
- The Web and HTTP
  - Overview of HTTP
  - Non-persistent and Persistent Connection
  - HTTP Message Format
  - User Interaction: Authorization and Cookies
  - The Conditional GET
- File Transfer Protocol (FTP)
  - Introduction
  - FTP Commands and Replies
- Mail Transfer and Mail Access Protocol
  - Simple Mail Transfer Protocol(SMTP)
  - Post Office Protocol 3(POP 3)
  - Internet Mail Access Protocol(IMAP)
  - Web Based Email
  - Multipurpose Internet Mail Extensions (MIME)
- Telnet
- Domain Name System(DNS)
  - Service Provided by DNS
  - Overview of How DNS Works

2.8 Web Caching
2.9 Peer to Peer File Sharing

Unit 3. Transport Layer: [6]

3.1 Introduction and Transport Layer Services
3.2 Relationship Between Transport and Network Layer
3.3 Transport Layer Protocol
- Connectionless Transport :User Datagram Protocol(UDP)
  - UDP segment Structure
  - Advantages and Disadvantages of Using UDP
  - Where to use UDP
- Connection Oriented Transport: Transmission Control Protocol(TCP)
  - Principles of Reliable Data Transfer
  - TCP Segment Structure

Unit 4. Network Layer and Routing: [17]

4.1 Introduction and Service Models

4.2 The Internet Protocol
- Major Components
- IP V4 Datagram Structure
- Classes ,IP V4 Addressing and Subnetting
- IP Datagram Fragmentation with Analysis

4.3 Routing in Internet
- Introduction of Routing
- Exterior Routing Protocol(EGP) and Interior Routing Protocol(IGP)
- Types
  - Static Routing
  - Dynamic Routing
  - Distance Vector Routing
    - Routing Information Protocol(RIP)
    - Interior Gateway Routing Protocol(IGRP)
    - Enhanced Gateway Routing Protocol(EIGRP)
    - Border Gateway Protocol
  - Link State Routing Protocol
    - Open Shortest Path First (OSPF)

4.1 Moving a Datagram From Source to Destination: Addressing ,Routing and Forwarding

4.2 Dynamic Host Configuration Protocol (DHCP)

4.3 Network Address Translation (NAT)

4.4 What's Inside a Router

4.5 Internet Protocol version 6 (IPV6)
- Introduction of IPV6 and its features
- IPV6 Datagram Format
- Translating From IPV6 to IPV4
  - Dual Stack approach and
  - Tunneling

Unit 5. Intranets: [2]

5.1 Introduction

5.2 Resources in Intranet

5.3 Services in Intranet

5.4 Usage, Benefit and Disadvantages of Intranet

Unit 6. Multimedia networking: [3]

6.1 Introduction of Multimedia Networking

6.2 Multimedia Networking Applications

6.3 Examples of Multimedia Applications
- Streaming Stored Audio and video
- Streaming Live Audio and Video
- Real Time Interactive Audio and Video

6.4 Hurdles for multimedia in Today's Internet

6.5 How Should Internet evolve to support Multimedia Better?

Unit 7. Security in computer networks: [8]

7.1 Introduction of Network Security

7.2 Desirable Properties of Secure Communication

7.3 Principles of Cryptography

- Concept of Private keys
- Symmetric key Cryptography
  - Mono alphabetic cipher
  - Poly alphabetic cipher
  - Data Encryption Standard
- Public key Encryption
  - Concept of public and private Keys

7.4 Authentication

7.5 Message Integrity and Basic Concept of generating Digital Signature

7.6 Role of Key Distribution center(KDC)

7.7 Access Control: Firewalls

- Introduction
- Types of Firewall
  - Packet Filtering Firewalls and
  - Application Level Gateways
- Attacks and Countermeasures
  - Mapping
  - Packet Sniffing
  - Spoofing
  - Denial of Service (DOS) Attack and Distributed DOS
  - Hijacking
- Secure Socket Layer (SSL)

Unit 8. Electronic Commerce: [2]

8.1 Introduction

8.2 E-marketing

8.3 Credit Card Verification

8.4 Payment Gateways

Practical: [45]

1. Assigning various class of IP address to end user devices, Subnetting.
2. Installation of Various Network Operating Systems (Windows Server /Linux).
3. Configuring DNS
4. Configuring HTTP server, FTP Server
5. C configuring DHCP service
6. Configuring NAT
7. Use of Various type of Packet Capture Software(Ethereal etc)

References books:

1. Computer Networking *James F. Kurose, Keith W. Ross*
2. Computer Networks *Tanenbaum*
3. Internet and Intranet Engineering *Daniel Minoli*

(g) Advanced computer Architecture

EG 3204 CT

Total: 8 hour /week

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

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

Practical: 3 hours/week

Course Description:

The primary objective of the advanced computer Architecture is to prepare students for in depth knowledge of computer architecture including parallel architectures, instruction-level parallel architectures, superscalar architectures, thread and process-level parallel architecture.

Course Objectives:

After completing this course the students will be able to:

1. understand parallel architectures
2. Concept of superscalar architectures
3. Concept of data-parallel architectures
4. Concept of Pipelined processors
5. SIMD and MIMD architectures

Course Objectives:

Unit1. Introduction [6]

1.1 The concept of a computational model, the von Neumann Computational model, evolution and interpretation of the concept of computer architecture, Interpretation of the concept of the computer architectures at different levels of abstraction, multilevel hierarchical framework

Unit 2. Parallel Processing [8]

2.1 Concept of a program, process, thread, processes and threads in languages, concurrent and parallel execution and programming languages, types of available parallelism, Levels of available functional parallelism, utilization of functional parallelelism, classification of parallel architectures, relationships between languages and parallel architectures.

Unit 3. Pipelined Processors [6]

3.1 Principle of pipelining, structure of pipelines, performance measures, application scenarios of pipelines, layout of a pipeline, dependence resolution, design space, pipelined processing of loads and stores

Unit 4. Superscalar Processors [10]

4.1 The emergence and widespread adaption of superscalar processors, specific tasks of superscalar processing, parallel decoding, superscalar instruction issue, scope of shelving, layout of shelving buffers, operand fetch policies, instruction dispatch schemes, detailed example of shelving, scope of register renaming, example of renaming

Unit 5. Processing of control transfer Instructions [6]

5.1 Types of branches, performance measures of branch processing, basic approaches to branch handling, delayed branching, branch processing, multiway branching

Unit 6. SIMD Architectures [6]

6.1 Fine-grained SIMD architectures, the Massively Parallel Processor and its example , Coarse –grained SIMD architectures, example of CM5, programming and applications

Unit 7. Vector Architectures [6]

7.1 Vectorization, pipelining, Parallel computing streams, the CRAY family, the convex C4/XA system, System software, applications on convex systems

Unit 8. Thread and process-level parallel architectures [12]

8.1 MIMD architectures concepts, design issues of scalable MIMD computers, multi-threaded architectures, dataflow architectures, hybrid multi-threaded architectures, distributed memory MIMD architectures, fine-gain systems, medium-gain systems, coarse-grain multicomputers, shared memory MIMD architectures, Cache coherence, Uniform memory access(UMA) machines, cache-coherent non-uniform memory access(CC-NUMA) machines, cache only memory architecture(COMA)

Practical: [45]

The practical should contain all features mentioned above.

References:

1. Advanced Computer Architectures: a design space approach, Deszo Sima, Terence Fountain, Peter Kacsuk
2. Computer Architecture and organization, John P. Hayes
3. Computer Organization and Design, David A. Patterson, John L. Hennessy

(h) Enterprise Resource Planning

EG 3204 CT

Total: 8 hour /week

Year: III **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 hours/week**
Practical: 3 hours/week

Course Description:

The course is designed to expose the students about enterprise wise integration of various management functions through open data base, EDI and communication network. It deals with the requirement engineering for the organizational transformation, enterprise system history and rational for acquisition and implement ERP.

Course Objectives:

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

1. develop motivation; reinforce entrepreneurial traits and the spirit of the enterprises
2. facilitate decision making process for setting up new enterprise via application of IT
3. facilitate successful and profitable operation of the enterprise
4. promote new enterprise creation and development

Course Contents:

Unit 1. Introduction to EFP **[12]**

- 1.1 Basic issues-traditional approach- benefits ERP
- 1.2 Integrated management information seamless integration
- 1.3 Supply chain management
- 1.4 Integrated data model
- 1.5 Business engineering and ERP
- 1.6 Definition of business engineering
- 1.7 Principle of business engineering
- 1.8 Business engineering with Computer Engineering

Unit 2. Business modeling for ERP **[12]**

- 2.1 Building the business model-an overview
- 2.2 ERP implementation
- 2.3 Role of consultant
- 2.4 Vendors and users
- 2.5 Customization
- 2.6 Precautions
- 2.7 ERP Post implementation options

Unit 3. ERP and the competitive advantage **[8]**

- 3.1. ERP domain
- 3.2. Industrial and financial systems
- 3.3. Baan IV SAP
- 3.4. Market dynamics
- 3.5. Dynamic strategy

Unit 4. Rationale for acquiring ERP system **[9]**

- Description
- Multi-client server solution

Open technology
User interface
Application integration
Transaction in ERP System

Unit 5. Architecture [9]

Basic architectural concepts
The system control interfaces
Services
Presentation interface
Database interface

Unit 6. Global ERP application (implementation) [10]

Major challenges associated with global perspective
Implementation strategy and steps
System implementation alternatives
Multiple security requirement involved with ERP
Case studies in ERP implementation

Practical: [45]

Internship exercises would be the server case studies in Business Industries who have been using a high level infrastructure of IT.

Textbooks and Readings:

1. Concepts in Enterprise Resource Planning, Brady, Monk and Wagner, Course Technology, Inc., 2001.
2. ERP: Making it Happen-The Implementers' Guide to Success with Enterprise Resource Planning, Wallace and Kremzar, John Wiley & Sons, Inc., 2001.
3. Vinod Kumar Garg and N.K. Venkita Krishnan, "Enterprise Resources Planning- Concepts and Practice", PHI, 1998.

(i) Business Information Systems (BIS)
EG 3204 CT

Total: 8 hour /week
Year: III **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 hours/week**
Practical: 3 hours/week

Course Description:
The course structure has three major segments that are viewed as integral parts of a logical and cohesive systems approach to manage information and Computer Engineering within a business:

Course Objectives:
On completion of this course, the students will be able to:
1. explain fundamentals of business operations and methodology of information systems
2. list and describe the Computer Engineering components: hardware, software, database and telecommunications networks
3. manage information systems within a business

Course Contents:

Unit 1. Foundations of Information Systems in Business: [6]

1.1 The major roles of information systems
1.2 Computer Engineering
1.3 Information system
1.4 Information versus data
- **IS** resources:
- Hardware resources
- Software resources
- Network resources
- Data resources

1.6 Transaction processing system
1.7 Process control system
1.8 Electronic Business (E-Business)
1.9 Electronic Commerce (E-Commerce)

Unit 2. Data Resource Management: [5]

2.1 Data structure (logical data contents
2.2 Data and database administration
2.3 Data modeling
2.4 Data dictionary
2.5 Database management system (DBMS)
2.6 Query language and report generator
2.7 Data warehouse
2.8 Data mining
2.9 Relational database
2.10 Distributed database

Unit 3. Telecommunications and Networks: [5]

3.1 Digital versus analog network
3.2 Modem
3.3 Bandwidth

3.4 Network architecture
3.5 Network standards and open systems
3.6 Network topology
3.7 Local Area Network (LAN) and Wide Area Network (WAN)
3.8 Fiber optic cable
3.9 Virtual private network
3.10 Network management system

Unit 4. Introduction to e-Business Systems: [5]

4.1 Batch processing
4.2 Online (real-time) systems
4.3 Inventory control
4.4 Cross-functional enterprise applications
4.5 Collaboration systems
4.6 Computer aided design (CAD) and Computer Aided Manufacturing (CAM)
4.7 Application (systems) architecture
4.8 Financial management systems

Unit 5. Enterprise e-Business Systems: [5]

5.1 Direct business model
5.2 Supply Chain Management (SCM)
5.3 Challenges of SCM
5.4 Enterprise Resource Planning (ERP)
5.5 Challenges of ERP
5.6 Customer Relationship Management (CRM)
5.7 Challenges of CRM
5.8 Outsourcing
5.9 Business value of IT/IS

Unit 6. Electronic Commerce Systems: [5]

6.1 Internet, intranet and extranet
6.2 B2B E-Commerce
6.3 B2C E-Commerce
6.4 C2C E-Commerce
6.5 Electronic payment systems
6.6 Electronic funds transfer
6.7 Workflow system
6.8 Access control, security and Firewall

Unit 7. Decision Support Systems: [5]

7.1 Decision structure
7.2 Decision support system versus management reporting
7.3 Data mining
7.4 Online Analytical Processing (OLAP)
7.5 Expert system
7.6 Artificial intelligence and neural network
7.7 Virtual reality

Unit 8. Developing Business/IT Strategies: [7]

8.1 Competitive advantage and strategies

8.2 Strategic information systems
8.3 Business vision and Business tactics
8.4 Reengineering business processes
8.5 Strategic planning
8.6 SWOT analysis
8.7 Total Quality Management (TQM)
8.8 Change management
8.9 Information systems architecture
8.10 Planning methodology
8.11 IT organization
8.12 Implementation

Unit 9. Developing Business/IT Solutions: [6]

9.1 Feasibility study
9.2 Cost/benefit analysis
9.3 Functional requirements
9.5 Prototype
9.6 Systems development life cycle
9.7 Conversion methods
9.8 Tangible versus intangible benefits
9.9 Post implementation review
9.10 Documentation

Unit 10. Security and Ethical Challenges: [6]

10.1 Audit trail
10.2 Backup files
10.3 Computer crime
10.4 Encryption
10.5 Fault tolerant
10.6 Procedural controls
10.7 Ergonomics
10.8 Disaster recovery
10.9 Spamming
10.10 Software piracy

Unit 11. Enterprise and Global Management of Computer Engineering: [5]

11.1 Centralization or decentralization of IT
11.2 Chief information officer
11.3 Chief technology officer
11.4 Downsizing
11.5 Operations management
11.6 Outsourcing IT operations
11.7 Information and development center

Practical: [45]

The practical should contain all features mentioned above.

Textbooks and Readings

1. Management Information Systems: Managing the Digital Firm (9th Edition) by Kenneth C. Laudon, Jane P. Laudon .
2. *Management Information Systems: Managing IT in the Business Enterprise*, 6th Edition, by James A. Obrien, Irwin McGraw-Hill, 2004.
3. Business: Its Legal, Ethical, and Global Environment by Marianne M. Jennings
4. Analysis & Design of Information System by James A. Senn
5. Essential of Management Information Systems by Laudson
6. Computer Engineering for Management by Efraim Turban

(j) Decision Support System

EG 3204 CT

Total: 8 hour /week

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

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

Practical: 3 hours/week

Course Description:

This course deals with an overview of management support systems, decision making, system modeling and support, data warehousing, access analysis, mining & visualization, modeling and analysis, group support system and enterprise decision support system.

Course Objectives:

After completing this course the students will be able to equip students with the knowledge of DSS in terms of its components, its relation with data warehouses, modeling, analysis, and as a tool for helping decision makers utilize both data and model to solve unstructured problems.

Course Contents:

Unit 1. Management support systems: An overview: [6]

1.1 Managers and decision making, Managerial decision making and information systems, Managers and computerized support, The need for computerized decision support systems, A framework for decision support, The concept of decision support systems, Group support systems, Executive Information systems, Expert systems and intelligent agents, Artificial neural networks, Knowledge management systems, Supporting enterprise resource planning, Hybrid support systems, Data mining, Data visualization, Business intelligence and the web

Unit 2. Decision making, systems modeling and support: [8]

2.1 Decision making: Introduction and definitions, Systems and models, Modeling process, Decision making: the intelligence phase, the design phase and the choice phase, Evaluation: Multiple goals, sensitivity analysis, what-if analysis and goal seeking, Implementation phase of decision making, Alternative decision-making models, Personality types, gender, human cognition and decision styles, Decision makers

Unit 3. Decision support systems: An overview: [6]

3.1 Configurations of DSS, Definition of DSS, Characteristics of DSS, Components of DSS, The data management subsystem, The model management subsystem, The knowledge-based management subsystem, The user interface (dialog) subsystem, DSS hardware, Differences between DSS and MIS, DSS classifications

Unit 4. Data warehousing, access, analysis, mining and visualization: [8]

4.1 Data warehousing, access, analysis and visualization, The nature and sources of data, Data collection, problems and quality, The internet and commercial database services, Database management systems in DSS, Database organization and structures, Data warehousing, OLAP

Unit 5. Modeling and analysis: [8]

5.1 Modeling for MSS, Static and dynamic models, Treating certainty, uncertainty and risk, Influence diagrams, DSS modeling in spreadsheets, Decision analysis of a few alternatives, Optimization, Heuristic programming, Multidimensional modeling-OLAP, Model base management

Unit 6. DSS development: [8]

6.1 Introduction to DSS development, The traditional system development life cycle, Alternate development methodologies, Prototyping, DSS technology levels and tools, DSS development platforms, DSS development tool selection, Team-developed DSS, End user-developed DSS, Developing DSS, DSS research directions and the DSS of the future

Unit 7. Collaborative computing technologies: Group Support Systems: [8]

7.1 Group decision making, communication and collaboration, Communication support, Collaboration support, Group support systems, Group support systems technologies, Group systems, The GSS meeting process, GSS and collaborative computing issues and research

Unit 8. Enterprise decision support systems: [8]

8.1 Enterprise systems: concepts and definitions, The evolution of enterprise information systems, The evolution of EIS, Executive's roles and their information needs, Characteristics and capabilities of Executive Support Systems, Comparison of EIS and DSS, Integration of EIS and DSS, EIS, data access, OLAP and the web, Including soft information in enterprise systems, Organizational DSS, Supply and value chains and decision support, Supply chain problems and solutions, Frontline DSS, The future of executives and Enterprise Support Systems

Practical: [45]

The practical should contain all features mentioned above.

References books:

1. Efrain Turban and Jay E. Aronson, Decision Support Systems and Intelligent Systems, Pearson Education Asia.

(k) Telecommunication

EG 3204 CT

Total: 8 hour /week

Year: III **Lecture: 4 hours/week**
Semester: II **Tutorial: 1 hours/week**
Practical: 3 hours/week

Course Description:

This course covers introduction to basic telephone communication, switching system, traffic system and Integrated Services Digital Network. Similarly, cellular phone system is also included.

Course Objectives:

After completing this course the student will able to:

1. explain Telephone communication
2. explain different types of telephone
3. able to explore switching system used in Telecommunication industry
4. able to explore signal switching from a systems approach
5. explain Integrated Services Digital Network and cellular system

Course Content:

Unit 1. Introduction to Telephone: [8]

1.1 Basic Telephone communication
- Basic switching system
- Transmission bridge
- Manual Telephony

1.2 LB exchange

1.3 CB exchange

1.4 Subscriber's line circuit
- Line circuit
- CB cord circuit
- Busy test
- Junction working

Unit 2. Electromechanical System: [8]

2.1 Rotary dial Telephone

2.2 Signaling tones

2.3 Strowger switching system

2.4 Principles of crossbar switching
- Crossbar switch configuration
- Crossbar exchange organization

2.5 EMD switching system

Unit 3. Switching System: [8]

3.1 Principles of common control

3.2 Touch tone dial telephone

3.3 Cross point technology
- No. 1 ESS

- Japanese D-10
- Metaconta

3.4 100-line switching system, 1000-line blocking exchange, 10,000 line exchange

Unit 4. Signal Switching: [10]

4.1 Stored program control
- Software architecture
- Application software
- Centralized SPC and Distributed SPC

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

4.3 Basic time division space switching and Time multiplexed space switching

4.4 Basic time division time switching and Time multiplexed time switching

4.5 Combination switching

Unit 5. Telephone Traffic System: [10]

5.1 Network traffic load and parameters

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

5.3 Incoming traffic and service time characterization

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

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

Unit 6. Integrated Services Digital Network: [8]

6.1 Motivation for ISDN and New services

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

6.3 ISDN standards

6.4 Broadband ISDN and Voice data integration.

Unit 7. Cellular Mobile Telephone: [8]

7.1 Basic cellular system

7.2 Mobile radio environment
- Trunking
- Efficiency
- Performance criteria

7.3 Operation of cellular systems

Practical: **[45]**

1. Study of Basic telephone System
2. Study of Subscriber's line circutit
3. Study of cross bar switch
4. Study of PABX system
5. Study of basic Mobile set
6. Study visit of telephone company.

Text books:

1. N.N. Biswas : Principles of Telephony
2. M.T. Hills : Telecommunication Switching Principles
3. T. Viswanathan : Telecommunication Switching Systems and Networks
4. W.C.Y. Lee : Mobile Cellular Telecommunication

Reference books:

1. J.Y. Bryce Using ISDN
2. J.C. Bellamy Digital Telephony.

(l) Distributed Operating System

EG 3204 CT

Year : III **Total: 8 hours / week**
Semester : II **Lecture: 4 hours / week**
Tutorial: 1 hour / week
Practical: 3 hours/week

Course Description:

Distributed Computing has become a key thrust area of concern to computer scientists and professionals. Distributed Computing, as distinct from other computing paradigms, such as Enterprise Computing and Client-Server Computing, is gaining more and more acceptance in application front due to its reliability, security, availability and flexibility.

Course Objective:

At the end of the course student

- provides the comprehensive exposure by concepts and techniques that how the operating systems are designed and implemented for efficient operation of distributed computer system.
- introduces the student to an exciting world of distributed computing paradigm.

Course Contents:

Unit 1: Distributed Systems and Design Aspects (8 hrs)

1.1 Introduction to Distributed Systems, Characteristics of Distributed Systems,
1.2 Design Objectives of Distributed Systems,
1.3 Basic Design Issues: Transparency, Flexibility, Reliability, Performance, Scalability
1.4 Required features and attributes,
1.5 Distributed System, System Models (Architecture and Fundamental Models),
1.6 Multiprocessors and Multicomputers,

Unit 2: Processes and Processors in Distributed Systems (6 hrs)

2.1 Thread concept, Thread usage, Design for Thread Packages,
2.2 System model: Workstation model, Processor Pool model, Hybrid Model,
2.3 Processor Allocation: Algorithms and Issues,
2.4 Scheduling, Faults and Various Fault Tolerance methods,
2.5 Real-time systems and issues

Unit 3: Inter-Process Communication (IPC) and Remote Procedure Call (RPC) (10 hrs)

3.1 Introduction to IPC, IPC Building Blocks
3.2 Methods of Inter-process of communications: Pipe, redirection, semaphore, message passing
3.3 Classical methods of communications: Producer-consumer problem, Dining Philosopher problem
3.4 Client-Server Communication,
3.5 Group Communication: Issues and types
3.6 Introduction to RPC, RPC Design Issues,

3.7 RPC: Operation, parameter passing, dynamic binding,
3.8 RPC Implementation.

Unit 4: Distributed Kernel and Clock (10 hrs)

4.1 DOS Kernel,
4.2 Naming and Protection Mechanism,
4.3 Communication and Invocation,
4.4 Virtual Memory,
4.5 Introduction to Name Services,
4.6 Physical Clock Synchronization: Logical Time and Logical Clock,
4.7 Distributed Coordination,

Unit 5: Naming Services and Replication (12 hrs)

5.1 Introduction to Naming Services,
5.2 Simple Naming Service (SNS) as a Naming Service Model,
5.3 Attributes and Design issues of SNS,
5.4 Case studies on DNS, GNS, and X.500,
5.5 Introduction to Replication, Basic Architectural Model,
5.6 Consistency and Request Ordering,
5.7 Gossip Architecture,
5.8 Process Groups and ISIS.

Unit 6: Security is DOS (8 hrs)

6.1 Introduction to Security aspects and Cryptography,
6.2 Authentication Mechanism,
6.3 Key Distribution Mechanism,
6.4 Kerberos as an example of Authentication System,
6.5 Logics of Authentication, Digital Signature.

Unit 7: Case Study (6 hrs)

7.1 Example of Distributed Operating System: AMOEBA and Mach Operating Systems.

Practical: (45)

1. Use the Net meeting in windows operating system showing the basic concept of distributed processing
2. Show the distributed processes in Linux environment by using the utilities as top, strace, etc
3. Use the Distributed File system in Windows NT showing how file being replicated.
4. C Programming involving Date and Time Routines for date and time manipulation.
5. C Programming involving TFTP and conventional FTP
6. C Programming involving Remote Login
7. C Programming involving Sockets
8. C Programming involving Winsock

Text Book:

1. Tanenbaum, Andrew S., *Distributed Operating Systems*, Pearson Education Asia, 2001, ISBN: 81-7808-294-2

Reference Book:

1. Coulouris, G., Dollimore, J., and Kindberg, T., *Distributed Operating Systems – Concepts and Design*, Second Edition, Addison-Wesley, Pearson Education Asia, 2000, ISBN: 981-235-989-3
2. Silberschatz, A., Galvin, P.B., Gagne, G., *Applied Operating Systems Concepts*, 1st Edition, John Wiley & Sons, 2000, ISBN: 9971-51-284-X

Object Oriented Analysis and Design

EG 3205 CT

Year : III **Total: 7 hours / week**
Semester : I **Lecture: 4 hours / week**
Tutorial: hour / week
Practical: 3 hours / week

Course Description:

This course provides key concepts and methodologies required to perform quality object-oriented software engineering, with particular attention to practical techniques such as use-case analysis, UML diagramming, and patterns for developing a software system.

Course Objectives:

After completing this course the students will be able to

1. identify objects, relationships, services and attributes that will teach students how to visualize, document and develop software artifacts from a given problem statement
2. understand the fundamental concepts of object orientation and the notation and semantics of the UML for performing Object Oriented Analysis and Design.
3. understand the problem domain and formulate solution to a given a system requirements description, from the Object Oriented Viewpoint.

Course Contents

Unit 1. Object Oriented Fundamentals [7]

- 1.1 Introduction OO Paradigm: Classes, objects, attributes, operations, methods, services, messages, encapsulation, inheritance, polymorphism, etc.
- 1.2 Types of relationships between classes and objects
- 1.3 Defining Models
- 1.4 Responsibility Driven Design
- 1.5 Object Oriented Development Cycle

Unit 2. The UML [10]

- 2.1 Overview and Fundamentals of the Unified Modeling Language and its Semantics
- 2.2 UML notations, Structural Models, Behavioral Models, Architectural Models: Class Diagram, Object Diagram, Use Case Diagram, Interaction Diagram, Collaboration Diagram, State Transition Diagram, Activity Diagram, Component Diagram, Deployment Diagram
- 2.3 UML based CASE tools and its use.

Unit 3. Object Oriented Analysis [17]

- 3.1 Requirements elicitation process, Interviews
- 3.2 Use cases Identification
- 3.3 Building Conceptual Model-Object Analysis, Identifying Object relationships
- 3.4 Adding Associations and Attributes
- 3.5 Representation of System Behavior: System Sequence Diagram and Operation Contracts
- 3.6 Case Study: Requirements analysis of a system (e.g. an ATM machine, a Vending Machine, an Air Conditioning System etc)

Unit 4. Object Oriented Design [18]

4.1 Mapping Analysis to Design
4.2 Design Issues
4.3 Describing and Elaborating Use Cases
4.4 Interaction Diagrams: Sequence Diagrams, Collaboration Diagram
4.5 Objects, Design Patterns and Reuse
4.6 Determining Visibility
4.7 Design Class Diagrams
4.8 Case Study: Detailed Design of the System used during the Analysis Phase

Unit 5. Implementation [8]

5.1 Mapping Design to Code
5.2 Creating Class Definitions from Design Class Diagrams
5.3 Creating Methods from Collaboration Diagram
5.4 Exception and Error Handling

Laboratory Exercises: [45]

Lab sessions are to be conducted to help students gain familiarity with the UML notations, and to make use of those notations to visualize and develop a software system. Students are required to perform a detailed requirements Analysis and Design of a real life problem domain as a part of their software project using standard UML tools like Eclipse IDE, Visio, Rational Studio and implement the skeleton in any Object Oriented Programming Language. The topic could be either initiated by the student or selected from a list provided by the instructor.

Reference Books:

1. Booch, G., "*Object-Oriented Analysis & Design"*, Pearson Education Asia, 2000, ISBN: 81-7808-156-3
2. Larman, C., "*Applying UML and Patterns*", Pearson Education Asia, 2000, ISBN: 81-7808-336-1
3. Ali Bahrami, "*Object Oriented Systems Development"*, Tata McGraw-Hill, 1999 (Unit I, III, IV, V).
4. Fowler, M., Scott, K., "*UML Distilled: Applying the Standard Object Modeling Language*", Addison-Wesley, 1997, ISBN: 981-4053-59-7
5. Booch, G., Jacobson, I., Rumbaugh, J., "*The Unified Software Development Process"*, Addison-Wesely, 1998, ISBN: 981-235-873-0

Recommended books:

Major Project

EG 3206 CT

Total: 4 hour /week

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

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

Practical: 4 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. Bikash Bahadur Shrestha, IOE Pulchok Campus
2. Daya Sagar Baral, IOE Pulchok Campus
3. Deepan Chapagain, IOE Pulchok Campus
4. Diwakar Raj Pant, IOE Pulchok Campus
5. Dr. Subarna Shakya, National Computer Engineering Centre
6. Jaya Ram Timsina, IOE Pulchok Campus
7. Jeetendra Kumar Manandhar, IOE Pulchok Campus
8. Jeevan Kumar Pant, IOE Pulchok Campus
9. Niraj Shakhakarmi, IOE Pulchok Campus
10. Nripa Dhoj Khadka, IOE Pulchok Campus
11. Prof. Shashidhar Ram Joshi, IOE Pulchok Campus
12. Prof. Timila Yami Thapa, IOE Pulchok Campus
13. Purushottam Sigdel, IOE Pulchok Campus
14. Rajendra lal Rajbhandari, IOE Pulchok Campus
15. Ram Krishna Maharjan, IOE Pulchok Campus
16. Sanjeeb Prasad Panday, IOE Pulchok Campus
17. Sharad Kumar Ghimire, IOE Pulchok Campus
18. Uttam Mali, IOE Pulchok Campus