First Year
[First and Second Semesters]

First Semester

Subjects:

1	1101 SH	Nepali
2	EG 1102 SH	Applied English
3	EG 1103 SH	Engineering Mathematics I
4	EG 1104 SH	Engineering Physics I
5	EG 1105 SH	Engineering Chemistry I
6	EG 1101 AR	Engineering Drawing I
7	EG 1101 CT	Computer Application

नेपाली

११०१ एस.एच.

वर्षः प्रथम | जम्माः ४ घण्टा/हप्ता
खण्डः प्रथम | प्रवचनः ४ घण्टा/हप्ता

कोर्षको परिचयः

यस विषयमा विद्यार्थीहरूले भावी व्यावसायमा प्रभावकारी ढङ्गले सञ्चार गर्नका लागि आवश्यक पर्ने ज्ञान र सीपसँग सम्बन्धित नेपाली सञ्चारात्मक भाषा, लेखन सीप अन्तर्गतका शीर्षक र कृति परिचयको ढाँचा गरी जम्मा ८ वटा एकाइहरू समावेश गरिएका छन्।

कोर्षको उद्देश्यः

यस पाठ्यांशको अध्ययनबाट विद्यार्थीहरूले निम्न लिखित भाषिक क्षमता विकास गर्न सक्नेछन्:-

१. आफ्नो व्यावसायिक कार्य क्षेत्रमा प्रभावकारी सञ्चार गर्न
२. आफ्नो व्यावसायसँघ सम्बन्धित विविध लेखन सीप प्रदर्शन गर्न
३. कार्य सम्पादनमा आवश्यक परिस्थितिजन्य संवाद गर्न।

एकाइ १: संचारात्मक नेपाली भाषा र नेपाली व्याकरण — **१४ घण्टा**

१.१ भाषिक भेदको परिचय — **३ घण्टा**

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

१.२ वर्णको परिचय — **२ घण्टा**

- नेपाली वर्णहरूको पहिचान
- ध्वनि र वर्ण
- स्वर वर्ण
- व्यञ्जनवर्ण

१.३ वर्ण विन्यास — **२ घण्टा**

- ह्रस्व र दीर्घ हुने नियम
- हलन्त र अजन्तको प्रयोग सम्बन्धी नियम
- शिरबिन्दु र चन्द्रबिन्दु सम्बन्धी नियमहरू
- पदयोग र पद वियोग सम्बन्धी नियम
- लेख्य चिह्नहरुको परिचय र प्रयोग सम्बन्धी नियमहरू

१.४ शब्द भण्डार — **३ घण्टा**

- स्रोतका आधारमा शब्दको वर्गीकरण
- बनोटका आधारमा
- कार्यका आधारमा

१.५. शब्द रूपायन — **२ घण्टा**

- रूपायनको परिचय
- नामको रूपायन
- सर्वनामको रूपायन
- विशेषणको रूपायन
- क्रियापदको रूपायन

१.६ वाक्य संश्लेषण र वाक्य विश्लेषण — **१ घण्टा**

- वाक्य संश्लेषण
- वाक्यविश्लेषण

१.७ पदसङ्गति — **१ घण्टा**

- पदसङ्गतिको परिचय
- पदसङ्गतिका प्रकार

एकाइ दुईः लेखन सिप **२२ घण्टा**

२.१ लेखन सिप **६ घण्टा**

- बोधको ज्ञान र अभ्यास

२.२ लेखन सिप **३ घण्टा**

- बुँदाटिपोट
- सारांश लेखन

२.३ लेखन सिप **३ घण्टा**

- संवाद लेखन
- अनुच्छेद लेखन

(कुनै एक)

२.४ लेखन सिप **४ घण्टा**

- निमन्त्रणापत्र
- सूचना
- सम्पादकलाई चिट्ठी
- निवेदन
- विज्ञापन
- बधाई ज्ञापन

(कुनै एक)

२.५ लेखन सिप **४ घण्टा**

- निबन्ध लेखन

२.६ लेखन सिप **२ घण्टा**

- प्रतिवेदन लेखन

एकाइ ३ः कृति/पाठ परिचय र कृति समीक्षा **२४ घण्टा**

३.१ निम्नलिखित ढाँचामा तलका कृति/पाठको परिचय लेख्ने अभ्यास **६ घण्टा**

क) कृतिहरूः

- म कसरी हार्छु (नाटक) गोविन्दबहादुर मल्ल गोठाले
- माइतघर (उपन्यास) लैनसिंह वाङ्देल
- राष्ट्रनिर्माता (खण्डकाव्य) माधवप्रसाद घिमिरे

ख) कृति परिचयको ढाँचा

- कृति/पाठको नामः
- कृति/पाठको रचनाकारको नामः
- कृति/पाठको मुख्य विषयः (एक अनुच्छेद)
- कृति/पाठको महत्वः (एक अनुच्छेद)
- कृति/पाठले आफूलाई पारेको प्रभावः (छोटो एक अनुच्छेद)
- कृति/पाठको भाषाशैलीः (छोटो एक अनुच्छेद)
- कृति/पाठको कमी, कमजोरी र सुझावः (छोटो एक अनुच्छेद)

३.२ कृति समीक्षा **१८ घन्टा**

क) कथाखण्ड **५ घण्टा**

- हरिदत्तः विश्वेश्वरप्रसाद कोइराला
- बितेका कुराः रुपनारायण सिंह
- मृगतृष्णाः माया ठकुरी

ख) निबन्ध खण्ड **५ घण्टा**

- पहाडी जीवनः लक्ष्मीप्रसाद देवकोटा

- एक पत्र— सम्पादकलाईः शङ्कर लामिछाने
- भान्सा भो हजुरः भैरव अर्याल

ग) कविता खण्ड **४ घण्टा**

- साहित्य सुधाः धरणीधर कोइराला
- हामीः भूपी शेरचन
- नचिनिने भएछौः अगमसिंह गिरी

घ) एकाङ्की **४ घण्टा**

- भावनाः भीमनिधि तिवारी

सिकाइ सामग्रीहरू

- कृष्णप्रसाद पराजुलीः राम्रो रचना मीठो नेपाली, सहयोगी प्रेस
- दयाराम श्रेष्ठ र मोहनराज शर्माः नेपाली साहित्यको सङ्क्षिप्त इतिहास, साझा प्रकाशन
- डा. मोहन बिक्रम थापाः साहित्य परिचय, साझा प्रकाशन
- विश्वेश्वरप्रसाद कोइरालाः दोषी चस्मा कथा सङ्ग्रह, साझा प्रकाशन
- माधवप्रसाद घिमिरेः राष्ट्र निर्माता खण्डकाव्य, साझा प्रकाशन
- लैनसिंह वाङ्देलः माइतघर उपन्यास, रत्न पुस्तक भण्डार
- गोविन्दबहादुर मल्ल गोठालेः भोको घर एकाङ्की सङ्ग्रह, साझा प्रकाशन
- व्यावहारिक नेपाली, टीकाहरि बराल, अस्मिता बुक्स पब्लिसर्स एण्ड डिस्ट्रिब्युटर्स प्रा.लि.पुतलीसडक काठमाडौं
- गोरखापत्र, कान्तिपुर आदि पत्रिका सम्पादकीय, टिप्पणी र लेखहरू
- प्रशिक्षकहरूले आफ्नो पुस्तक तयार गर्न वा बजारमा पाइने सामग्री छानेर पढाउन सक्ने

विशिष्टीकरण तालिका

एकाइ	शीर्षक	समय	पूर्णांक
१	**संचारात्मक नेपाली भाषा र नेपाली व्याकरण**	**१४ घण्टा**	**पूर्णाङ्क (२४)**
	१.१ भाषिक भेदको परिचय	३ घण्टा	पूर्णाङ्क (४)
	१.२ वर्णको परिचय	१ घण्टा	पूर्णाङ्क (२)
	१.३ वर्णविन्यास	३ घण्टा	पूर्णाङ्क (४)
	१.४ शब्द भण्डार	३ घण्टा	पूर्णाङ्क (२)
	१.५ शब्द रुपायन	२ घण्टा	पूर्णाङ्क (४)
	१.६ वाक्य संश्लेषण र वाक्य विश्लेषण	३ घण्टा	पूर्णाङ्क (४)
	१.७ पदसङ्गति	३ घण्टा	पूर्णाङ्क (४)
२	**लेखन सीप**	**२२ घण्टा**	**पूर्णाङ्क (३२)**
	२.१ लेखन सीप (बोधको ज्ञान)	६ घण्टा	पूर्णाङ्क (८)
	२.२ लेखन सीप (बुँदा लेखन, सारांश लेखन)	३ घण्टा	पूर्णाङ्क (४)
	२.३ लेखन सीप (संवाद लेखन, अनुच्छेद लेखन)	३ घण्टा	पूर्णाङ्क (४)
	२.४ लेखन सीप (निमन्त्रणा पत्र, सूचना, सम्पादकलाई चिठ्ठी, निवेदन, विज्ञापन, बधाई ज्ञापन)	४ घण्टा	पूर्णाङ्क (४)
	२.५ लेखन सीप (निबन्ध लेखन)	४ घण्टा	पूर्णाङ्क (८)
	२.६ लेखन सीप (प्रतिवेदन लेखन)	२ घण्टा	पूर्णाङ्क (४)
३	**कृति/पाठको परिचय लेख्ने अभ्यास**	**२४ घण्टा**	**पूर्णाङ्क (२४)**
	३.१ कृति/पाठको परिचय लेख्ने अभ्यास	६ घण्टा	पूर्णाङ्क (८)
	३.२ कृति समीक्षा	१८ घण्टा	पूर्णाङ्क (१६)
	क. कथा खण्ड	५ घण्टा	पूर्णाङ्क (४)
	ख. निवन्ध खण्ड	५ घण्टा	पूर्णाङ्क (४)
	ग. कविता खण्ड	४ घण्टा	पूर्णाङ्क (४)
	घ. एकाङ्की	४ घण्टा	पूर्णाङ्क (४)

Applied English
EG 1102 SH

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

Course Description:
This course is designed with a view to provide students techniques in using English for academic and communicative purposes, train them in the comprehending varieties of texts, terminologies, grammatical and communicative areas of English language, make them see the relationship between structure and meaning. This guides the students from general to comprehensive understanding of language.

Course Objectives:
On completion of the course the students will be enabled to:

1. Construct sensible sentences applying the grammatical structures.
2. Answer the questions given after the comprehension passage.
3. Use terminologies vocabularies to construct sensible sentences.
4. Conduct a dialogue in given situation.
5. Write paragraphs on people, place and events correctly and meaningfully.
6. Analyze the literary texts.

Section One: Language Development **[40 Hrs.]**

Unit 1: Technology **[4 Hrs.]**

1.1 Reading comprehension: Hyper loop
  1.1.1 Use of technological terms
  1.1.2 Use of prefixes
  1.1.3 Question- answer
1.2 Issuing a press release
1.3 Subject Verb agreement
1.4 Summarizing
1.5 Project Work

Unit 2: Money and Economy **[4 Hrs.]**

2.1 Reading comprehension: QR Code
  2.1.1 Use of terminologies
  2.1.2 Abbreviations
  2.1.3 Vowel sounds
  2.1.4 Question- Answer
2.2 Writing a news article
2.3 Questions:
  2.3.1 Yes/no questions
  2.3.2 Wh - questions
  2.3.3 Indirect and direct questions
2.4 Expressing necessity
2.5 Project Work

Unit 3: Human Culture **[4 Hrs.]**

3.1 Reading Comprehension: Land of Plenty
  3.1.1 Word Formation: Root, Prefixes and prefixes

3.1.2 Question-answer
3.2 Writing:
3.2.1 Paragraph
3.2.2 Letter to the editor
3.3 Adjectives and Adverbs
3.4 Making comparison and contrast
3.5 Project Work

Unit 4: Ecology and Environment **[4 Hrs.]**

4.1 Reading Comprehension: Living in a Redwood Tree
4.1.1 Terminologies used in ecology
4.1.2 Compound words
4.1.3 Question - answer
4.2 Writing a book/film review
4.3 Reported Speech
4.4 Reporting
4.5 Project Work

Unit 5: Career Opportunities **[4 Hrs.]**

5.1 Reading Comprehension: Presenting Yourself
5.1.1 Employment-related terminologies
5.1.2 Answering questions
5.2 Writing job application with CV
5.3 Conditional Sentences
5.4 Clarifying
5.5 Project Work

Unit 6: Human Rights **[4 Hrs.]**

6.1 Reading Comprehension: "I am Sorry"- The Hardest Three Words to Say
6.1.1 Word formation
6.1.2 Question-answer
6.2 Writing Paragraphs on Steps on making education equal
6.3 Connectives
6.4 Group work: Criticizing
6.5 Project Work

Unit 7: War and Peace **[4 Hrs.]**

7.1 Reading comprehension: Train to Pakistan
7.1.1 Terminologies
7.1.2 Question -answer
7.1.3 Vowels: Monophthongs and diphthongs
7.2 Describing People, place or event
7.3 Past simple, Past continuous, Past perfect, Past perfect continuous tense
7.4 Group work: Making Announcements
7.5 Project Work

Unit 8: Music and Creation **[4 Hrs.]**

8.1 Reading Comprehension: A Life of Sound and Silence
8.1.1 Terminologies used in music
8.1.2 Word Stress
8.1.3 Question -answer

8.2 Writing a bibliography.
8.3 Preposition of time
8.4 Group work: Predicting
8.5 Project Work

Unit 9: Migration and Diaspora **[4 Hrs.]**

9.1 Reading Comprehension: Dediasporization: Homeland and Hostland
- 9.1.1 Consonants: Voiced and voiceless sounds
- 9.1.2 Stressed an unstressed syllable
- 9.1.3 Question - answer

9.2 Interpreting data in charts and graphs
9.3 Would/ Used to
9.4 Narrating past events
9.5 Project Work

Unit 10: Power and Politics **[4 Hrs.]**

10.1 Reading Comprehension: An Open Letter to Mary Daly
- 10.1.1 Terminologies used in politics
- 10.1.2 Consonant cluster
- 10.1.3 Question- answer

10.2 Writing an article for a newspaper
10.3 Adjective order
10.4 Pair work: Denying
10.5 Project Work

Section Two: Literature **[20 Hrs.]**

Unit One: Short Stories

1. The Treasure in the Forest - H. G. Wells
2. My Old Home - Lu Xun
3. The Half-closed Eyes of the Buddha and the Slowly Sinking Sun -Shankar Lamichhane
4. A Very Old Man with Enormous Wings - Gabriel Garcia Marquez

Unit Two: Poems

1. The Awakening Age - Ben Okri
2. Soft Storm – Abhi Subedi

Unit Three: Essays

1. Knowledge and Wisdom - Bertrand Russell
2. Humility - Yuval Noah Harari
3. Human Rights and the Age of Inequality - Samuel Moyn

References:

1. Panday, Ram Kumar. *Yeti Tells.* SajhaPrakashan.3rd edition. Kathmandu, 2050.
2. Ancient Tales.Ed, Lohani, Shreedhar P, Adhikari Rameshwar P and Subedi, Abhi N. Educational Enterprises Pvt Ltd: Kathmandu,1996.
3. Grade 12 English. Centre for Curriculum Development, Government of Nepal: Sano Thimi, 2077.
4. Poudel, R.C., A Manual to Communicative English, K.P. Pustak Bhandar, Kathmandu, 1956/57.

5. Shah, B.L., A text book of writing skills in English, First edition Hira Books Enterprises, Kathmandu,
6. Fruehling, R. T. and Oldham N. B., Write to the point, McGraw- Hill, Inc. New York NY 10020
7. Taylor, G., English conversation practice, 1975.
8. Maharjan L. B., A textbook of English sounds and Structures, Vidyarthi Pustak Bhandar, Kathmandu,2000.
9. Blundell, Jon, Higgens, Jonathan & Middlemiss, Nigel, Function of English, Oxford University Press
10. Better English Pronunciation, Cambridge University Press, New edition
11. Link English, Central Department of English, Tribhuvan University
12. 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.
13. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Evaluation Scheme

Units	Title	Hours	Mark distribution*
Language Development			
1.	Technology	4	5
2.	Money and Economy	4	5
3.	Human Culture	4	5
4.	Ecology and Environment	4	5
5.	Career Opportunities	4	4
6.	Human Rights	4	5
7.	War and Peace	4	5
8.	Music and Creation	4	4
9.	Migration and Diaspora	4	5
10.	Power and Politics	4	5
Total		**40**	**48**
Literature			
1.	The Treasure in the Forest - H. G. Wells	3	7×2
2.	My Old Home - Lu Xun	3	
3.	The Half-closed Eyes of the Buddha and the Slowly Sinking Sun -Shankar Lamichhane	3	
4.	A Very Old Man with Enormous Wings - Gabriel Garcia Marquez	3	
5.	The Awakening Age - Ben Okri	1	6×1
6.	Soft Storm – Abhi Subedi	1	
7.	Knowledge and Wisdom - Bertrand Russell	2	6×2
8.	Humility - Yuval Noah Harari	2	
9.	Human Rights and the Age of Inequality - Samuel Moyn	2	
Total		**20**	**32**

Any four questions out of five groups should be attempted from literature.

Engineering Mathematics I
EG 1103 SH

Year: I **Total: 6 hours /week**
Semester: I **Lecture: 4 hour/week**
Tutorial: 2 hours/week
Practical: hours/week
Lab: hours/week

Course Description:
This course consists of five units namely: Set and Function, Trigonometry, Calculus, Algebra, Coordinate Geometry; which are basically necessary to develop mathematical knowledge and helpful for understanding as well as practicing their skills in the related engineering fields.

Course Objectives:
On completion of this course, students will be able to understand the concept of the following topics and apply them in the related fields of different engineering areas:

- Ideas of real number system and functional relation between parameters
- Trigonometric equations, inverse circular functions and properties of triangles
- Progressions, permutations and combinations, binomial theorem, exponential and logarithmic series
- Straight lines, pair of lines and circle, Limit and continuity, derivatives and anti-derivatives

Course Contents:

Unit 1: Set, Functions and Graphs [7 Hrs.]

- Cardinality of set, Power set, Properties of set algebra, De Morgan's laws,
- Real number systems, intervals and absolute value
- Relations and Functions, idea of domain and range
- Types of functions, exponential and logarithmic functions with their graphs

Unit 2: Trigonometry [11 Hrs.]

2.1. Revision: Basic trigonometric formulae, Identities and conditional identities, Height and distance

2.2. Trigonometric Equations and Inverse Circular Functions

- General solutions of the equations of type Sin x= k, Cos x = k and Tan x = k
- Formulae involving inverse circular functions
- Simple identities and equations involving circular functions

2.3. Properties of Triangles

- The Sine, Cosine and projection laws (with proofs)
- The half angle formulae, Tangent laws and area of a triangle (without proofs)
- Simple cases on solution of triangles

Unit 3: Calculus [18 Hrs.]

3.1. Limit and Continuity

- Limit of functions, Indeterminate forms (only $\frac{0}{0}, \frac{\infty}{\infty}$ and $\infty - \infty$)
- Algebraic properties of limits (without proof)

- Theorems on limits (without proof)
- Continuity and discontinuity of function, types of discontinuity

3.2. Derivatives

- Definition, geometrical and physical meanings of derivative
- Derivatives from definition of simple functions like: x^n,$(ax+b)^n$, $sin\ (ax+b)$,e^{ax}, a^x and $log\ x$
- Rules of derivatives (sum, difference, product, quotient and chain rules)
- Derivatives of trigonometric, parametric and implicit functions
- Higher order derivatives

3.3. Integration

- Definition and notation, Basic rules of integration
- Fundamental integrals and Integration by substitution
- Integration by parts and Definite integrals

Unit 4: Algebra [12 Hrs.]

4.1. Progressions

- Arithmetic, Geometric and Harmonic Progressions
- Sum of infinite geometric series, Sum of First natural numbers
- Sum of squares and cubes of First n natural numbers (without proof)

4.2. Permutations and Combinations

- Principle of counting, Types of Permutation
- Combination and its properties (without proof)

4.3. The Binomial Theorem

- Binomial theorem (without proof)
- Expansion of binomial expressions, general terms, middle terms
- and terms free from variables
- Expansion of binominal expression for any index
- Expansion of exponential and logarithmic functions (without proof)

Unit 5: Coordinate Geometry [12 Hrs.]

5.1. Straight Lines

- Three standard forms of a line, general form: $ax + by + c = 0$, the line
- through the intersection of two lines, the concurrency of lines, area of triangle
- Angle between two lines, bisector of angle between two lines
- and length of perpendicular from a point on a line

5.2. Pair of Lines

- Homogeneous equation of second degree
- General equation of second degree representing two lines
- Angle between a pair of lines and bisectors of the angles for a line pair (without proof)
- Condition for general equation of second degree to represent a line pair (without proof)
- Lines joining the origin to the points of intersection of a curve and a line

5.3. The Circle

- Standard and central forms
- General and Diameter forms (without proof)
- Tangent and normal to the circle
- Condition of tangency of a straight line to a circle (without proof)

Tutorial **[30 Hrs.]**

1. **Set, function and graphs** **[2 Hrs.]**
2. **Trigonometry** **[5 Hrs.]**
   - Trigonometric Equations and Inverse Circular Functions [2 Hrs.]
   - Properties of Triangles [3 Hrs.]
3. **Calculus** **[10 Hrs.]**
   - Limit and Continuity [2 Hrs.]
   - Derivatives [4 Hrs.]
   - Integration [4 Hrs.]
4. **Algebra** **[7 Hrs.]**
   - Progressions [2 Hrs.]
   - Permutations and Combinations [2 Hrs.]
   - The Binomial Theorem [3 Hrs.]
5. **Coordinate Geometry [6 Hrs.]**
   - Straight Lines [2 Hrs.]
   - Pair of Lines [2 Hrs.]
   - The Circle [2 Hrs.]

Evaluation Scheme

Unit wise Marks division for Final

S. N.	Units	Short questions (2 marks)	Long questions (4 marks)	Total Marks
1	Set, function and graphs	2x2=4	1x4=4	8
2	Trigonometry	3x2=6	2x4=8	14
3	Calculus	4 x 2 = 8	4 x 4 = 16	24
4	Algebra	3 x 2 = 6	3 x 4 = 12	18
5	Coordinate Geometry	2 x 2 = 4	3 x 4 = 12	16
		14 x 2 = 28	**13 x 4 = 52**	**80**

Reference Books

1.Thapa et al., Engineering Mathematics (Volume I, Three Years Diploma), Sukunda Pustak Bhawan, Bhotahity, Kathmandu, Nepal

2. Bajracharya et al., Basic Mathematics (Grade XI/XII), Sukunda Pustak Bhawan, Bhotahity, Kathmandu, Nepal

3. Nath et al., Engineering Mathematics I, Vidhyarthi Publisher and distributors, Bhotahity, Kathmandu, Nepal

4. Other references selected by the related lecturer(s) from among the texts available in the market that meet the content of this subject.

Engineering Physics I
EG 1104 SH

Year: I **Total: 8 hours /week**
Semester: I **Lecture: 4 hour/week**
Tutorial: 2 hours/week
Practical: hours/week
Lab: 2 hours/week

Course Description

This course in physics is designed to provide students with an understanding of the scientific laws of our physical world, and how physics contributes to life's activities in modern society. The course emphasizes both quantitative and qualitative aspects of physics, involving mathematical models and equations. The application of physics to social and environmental situations is well illustrated.

The practical component of this course is designed to supplement learning through the application of learned theory. The students will handle simple apparatus to do simple measurements, demonstrate simple electrical circuits, and apply their knowledge of physics to real life examples.

Course Objectives

On completion of the course the student will be able to:

- Sustain interest in physics and its applications related to everyday experiences of their life
- Identify the social, economic, environmental and other implications of physics
- Describe physics as a coherent and developing framework of knowledge based on fundamental theories ofthe structures and processes of the physical world
- Demonstrate the skills of experimenting, observing, interpreting data and evaluating evidence to formulate generalizations and models
- Apply knowledge of physical principles to familiar and unfamiliar situations
- Apply facts, vocabulary and conventions to unit measurements and common measuring instruments
- Explain the definitions, laws, concepts, theories and models presented in this course.
- Describe the applications and implications of physical facts and principles.
- Explain the basic concept of Physics relevant to problems for the understanding
- and practicing related in engineering works.

Course content

Unit 1: Mechanics **[22 Hrs.]**

Sub-Unit 1.1: Units and Measurement **[2 Hrs.]**

- Physical concept of mass, length and time.
- Various systems of units and their conversion
- Derived units in terms of fundamental units.
- Precise and accurate measurement
- Dimensional formula for various physical quantities.
- Applications of dimensional equations.
- Simple Numerical Problems

Sub-unit 1.2: Scalars and Vectors **[3 Hrs.]**

- Scalars and vectors with examples.
- Resolution of a vector.

- Triangle and parallelogram law of vectors
- Multiplication of vectors
- Simple Numerical Problems

Sub unit 1.3: Kinematics [2 Hrs.]

- Revision of equations of motion
- Projectile motion
- Concepts of relative velocity
- Simple Numerical Problems

Sub-unit 1.4: Newton's Laws of motion [2 Hrs.]

- Newton's first, second and third laws of motion.
- Principle of conservation of linear momentum.
- Applications of inertia and impulse.
- Laws of solid friction, angle of friction and angle of repose
- Simple Numerical Problems

Sub unit1.5: Uniform circular Motion [3 Hrs.]

- Angular displacement and velocity
- Derivation of the relation $v = \omega r$.
- Vector nature of velocity and change thedirection of velocity in circular motion.
- Derivation of centripetal acceleration and force.
- Motion of a body in a vertical circle.
- Motion of cyclist and motion of vehicle in banked road
- Simple numerical problems

Sub-unit 1.6: Work, Energy and power [3 Hrs.]

- Definition and units of work, energy and power and its meaning in Physics
- Potential and kinetic energy.
- Work energy theorem.
- Conservation of energy i.e. change of KE into PEgiving example of freely falling body.
- Transformation of energy into different forms.
- Conservative and non-conservative forces.
- Simple numerical problems.

Sub-unit 1.7: Gravity and Gravitation [3 Hrs.]

- Newton's law of gravitation.
- Acceleration due to gravity and its variation due to height, depth and latitude
- Motion of satellites: Escape velocity, orbital velocity, geostationary satellite
- Weightlessness condition in a lift
- Simple numerical problems

Sub unit 1.8: Simple Harmonic Motion [2 Hrs.]

- Simple harmonic motion and its characteristics
- Time period, frequency, amplitude of simple harmonic motion
- Speed and acceleration in simple harmonic motion
- Energy of simple harmonic motion
- Simple pendulum and its time period
- Simple numerical problems

Sub unit 1.9: Rotation of Rigid bodies [2 Hrs.]

- Forces in equilibrium, center of gravity, center of mass
- Torque, work done by torque, couple
- Moment of inertia

- Angular momentum and its conservation
- Simple numerical problems

Unit 2: Heat and Thermodynamics [18 Hrs.]

Sub unit 2.1: Heat phenomena and Quantity of heat [3 Hrs.]

- Concepts of temperature and thermal equilibrium
- Different scales of temperature and their relations
- Quantity of heat gain and heat loss
- Specific heat capacity and its determination by method of mixture
- Newton's laws of cooling and its explanation
- Simple Numerical Problems

Sub unit 2.2: Change of Phase and Hygrometry [2 Hrs.]

- States of matter, fusion, vaporization, evaporation and boiling
- Determination of specific latent heat of fusion and vaporization
- Saturated and unsaturated vapors
- Variation of melting and boiling points with pressure
- Triple point, dew point and humidity
- Simple Numerical Problem

Sub unit 2.3: Thermal Expansion [3 Hrs.]

- Coefficients of linear, superficial and cubical expansion of a solid and relation between them
- Real and apparent expansions of liquids and their relation
- Variation of density due to change in temperature
- Simple Numerical Problems

Sub unit 2.4: Transfer of Heat [2 Hrs.]

- Methods of heat transfer
- Thermal conduction, conductivity and determination of thermal conductivity
- Radiation
- Black body and its practical realization
- Stefan's law of black body radiation
- Simple Numerical Problems

Sub unit 2.5: Gas Laws and Kinetic Theory of Gas [3 Hrs.]

- Boyle's law, Charle's law and ideal gas equations
- Universal gas constant, Avogadro's number and Boltzmann's constant
- Volume and pressure coefficients of ideal gas
- Pressure exerted by ideal gas according to kinetic theory
- RMS speed and mean energy of a molecule of an ideal gas
- Simple Numerical Problems

Sub units 2.6: Thermodynamics [5 Hrs.]

- First law of thermodynamics
- Thermodynamic processes: Isothermal, adiabatic, isobaric and isochoric
- Equation of adiabatic process.
- Work done in isothermal and adiabatic process.
- Specific and molar heat capacities at constant pressure and constant volume with their relation
- Second law of thermodynamics, working of ideal engine and refrigerator
- Simple Numerical Problems

Unit 3: Optics **[12 Hrs.]**

Sub unit 3.1: Reflection by plane surface **[2 Hrs.]**

- Laws of reflection
- Deviation produced by plane mirror
- Effect on reflected ray due to rotation of mirror
- Minimum size of mirror to see full image of a person.
- Real and virtual images

Sub unit 3.2: Reflection by spherical surfaces **[2 Hrs.]**

- Reflection by concave and convex mirrors
- Formation of image by concave and convex mirrors
- Derivation of mirror formula for concave and convex mirrors
- Uses of spherical mirrors
- Simple numerical Problems

Sub unit 3.3: Refraction through Plane Surfaces **[3 Hrs.]**

- Laws of refraction of light
- Speed of light in different media
- Principle of reversibility of light
- Lateral Shift
- Real and apparent depths
- Total internal reflection and critical angle
- Simple Numerical Problems

Sub unit 3.4: Refraction through Prism and Lenses **[5 Hrs.]**

- Deviation through prism and minimum deviation
- Refraction through lenses
- Formation of images by lenses
- Lens formula and lens maker's formula
- Combination of two thin lenses
- Power and magnification of lenses
- Uses of lenses in compound microscope and Astronomical telescope
- Simple Numerical Problems

Unit 4: Magnetism **[8 Hrs.]**

Sub unit 4.1: Magnets and magnetic fields **[3 Hrs.]**

- Magnetic poles, magnetic moments, magnetic axis, magnetic meridian, real and effective length of magnet
- Magnetic field, magnetic lines of force, Coulomb's law in magnetism
- Magnetic field intensity on axial and equatorial line due to magnetic poles of bar magnet
- Neutral points and Tangent's law
- Simple Numerical Problems

Sub unit 4.2: Terrestrial Magnetism **[2 Hrs.]**

- Horizontal and vertical components of earth's magnetic field
- Angle of declination and angle of dip
- Total intensity of earth's magnetic fields
- Simple Numerical Problems

Sub unit 4.3: Magnetic Properties of Materials **[3 Hrs.]**

- Molecular and modern theory of magnetism
- Dia, Para and Ferromagnetic materials

- Permeability, susceptibility and intensity of magnetization
- Domain theory of ferromagnetism
- Magnetic Hysteresis

Tutorial:
The instructors should practice the numerical problems of following topics as indicated by credit hours.

S. N.	Units	Sub Units	Credit Hrs.	
1	Mechanics	Units and Measurements	1	13
		Scalars and Vectors	1	
		Kinematics	2	
		Newton's Law of Motion	2	
		Works, Energy and Power		
		Gravity and Gravitation	1	
		Uniform Circular Motions	1	
		Simple Harmonic Motion	2	
		Rotation of Rigid Bodies		
		Heat phenomena and quantity of heat	2	
		Change of State and Hygrometry	1	
2	Heat and Thermo Dynamics	Thermal Expansion	2	10
		Transfer of Heat	2	
		Gas Laws and Kinetic theory of Gas		
		Thermodynamics	1	
		Reflection through Plane Surface	2	
		Reflection through Spherical Surface	2	
		Refraction through Plane Surface	1	
3	Optics	Refraction through prism and lenses	-	4
		Magnet and Magnetic Fields	1	
		Terrestrial Magnetism	1	
		Magnetic properties of Materials	2	
4	Magnetism	Permeability, susceptibility and intensity of magnetization	2	3
		Magnetic Hysteresis	1	
Total credit hour			**30**	

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

1. Find volume and density of hollow tube using Vernier calipers.
2. Determine density of a steel / glass using micrometer screw gauge.
3. Determine thickness volume and density of a glass plate using spherometer.
4. Determine the acceleration due to gravity by using simple pendulum.
5. Determine the magnetic movement of a bar magnet using deflection magnetometer.
6. Determine the refractive index of the material of prism.
7. Determine the specific heat capacity of solid by the method of mixture.
8. Determine the specific latent heat of ice by the method of mixture.
9. Determine specific gravity of different solids by up thrust method.
10. Determine focal length of a converging lens by displacement method.

Prescribed Books

1. Engineering Physics –I, 5th edition, Devkota Binaya, Poudyal Khem Nath, Poudyal Dhan Prasad, Gupta Suresh Prasad, Laxmi publication Kathmandu.
2. Advanced level physics by Nelkon and Parker, 5th and later editions
3. College physics by sears, Zemansky and Young, Fourth and later editions
4. Physics practical by S.K. Neupane

Learning materials:

1. Reference to be selected by the related lecture(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.

Evaluation Scheme

There will be questions covering all the chapters in the syllabus. The evaluation scheme for the questions will be as indicated as in the table below.

S. N.	Units	Sub Units	Credit Hrs.		Total marks
1	Mechanics	Unit and Measurement	2	9	8
		Scalars and Vectors	3		
		Kinematics	2		
		Newton's Law of Motion	2		
		Works, Energy and Power	3	13	16
		Gravity and Gravitation	3		
		Uniform Circular Motions	3		
		Simple Harmonic Motion	2		
		Rotation of Rigid Bodies	2		
2	Heat and Thermal Dynamics	Heat phenomena and quantity of heat	3	18	16
		Change of State and Hygrometry	2		
		Thermal Expansion	3		
		Transfer of Heat	2		
		Gas Laws and Kinetic theory of Gas	3		
		Thermodynamics	5		
3	Optics	Reflection through Plane Surface	2	12	12
		Reflection through Spherical Surface	2		
		Refraction through Plane Surface	3		
		Refraction through prism and lenses	5		
4	Magnetism	Magnets and Magnetic Fields	3	8	8
		Terrestrial Magnetism	2		
		Magnetic properties of Materials	3		
Total credit hour			**60**	**60**	**60**

Engineering Chemistry-I
EG 1105 SH

Year: I **Total: 8 hours /week**
Semester: I **Lecture: 4 hour/week**
Tutorial: 2 hours/week
Practical: hours/week
Lab: 2 hours/week

Course Description:
This subject consists of three units related to language of chemistry, general chemistry and system of classification.

Course Objectives:
After the completion of this subject, students will be able to

- Develop a basic knowledge and concept of chemical reactions.
- Solve simple numerical problems related on atomic weight, molecular weight, mole concept.
- Explain the different theories of acid and base and to know the concept of pH and buffer solution.
- Know about atomic structure, periodic table and chemical bonding.
- Prepare different concentration of solution and solve simple numerical problem.
- Describe the laws of electrolysis and solve related numerical problems.
- Explain the basic concept of Chemistry relevant to problems for the understanding and practicing related in engineering works.

Course Content

Unit 1: Language of Chemistry **[8 Hrs.]**

1.1. Symbol **[1 Hr.]**

- Introduction
- Definition
- Name and symbol of elements up to atomic number 30
- Concept of symbol which were derived from Latin or other languages such as Potassium, sodium, iron, copper, gold, lead, mercury, silver, and tin etc.
- Significances of symbol (qualitative and quantitative)

1.2. Formula, valency and radicals **[2 Hrs.]**

- Introduction
- Definition of molecular formula & Structural formula
- Qualitative and quantitative significances of molecular formula
- Concept of valency in terms of combining capacity with H2, O2 and Cl2
- Variable valency (ref Fe, Sn, Cu, Pb, Hg, S, N)
- Radicals
  - classify the radicals as electro- positive and electro – negative with examples
  - concept of simple, compound and complex radicals
- Methods of writing the molecular formula

1.3. Chemical equation **[5 Hrs.]**

- Introduction
- Essentials of chemical equation

- Significance of chemical equation (qualitative and quantitative)
- Limitation of chemical equation
- Making the chemical equation more informative
- Balancing chemical equation by
  - hit and trial method
  - partial equation method (ref. reaction involving HNO_3, MnO_2, $KMnO_4$, $K_2Cr_2O_7$ etc.)
- Types of chemical reaction:
  - combination, decomposition, displacement, double displacement, acid base, hydrolysis, polymerization
- Conditions of bringing about chemical reactions

Unit 2: General Chemistry **[16 Hrs.]**

2.1. Atom and molecule **[2 Hrs.]**

- Definition
- Postulates of Dalton's atomic theory
- Modern position of the theory
- Limitations of Dalton's atomic theory

2.2. Atomic weight **[4 Hrs.]**

- Introduction
- Definition
- Atomic weight of an element
- Atomic mass unit
- Gram atomic mass unit
- Concept of fractional atomic mass unit (ref giving example of chlorine)
- Dulong and Petit's method and its limitations
- Steps involved for the determination of atomic weight by Dulong and petit's method
- Solving related simple numerical problems

2.3. Molecular weight **[4 Hrs.]**

- Introduction
- Definition of molecular weight of an elements or compounds
- Gram molecular weight
- Concept of Avogadro's hypothesis
- Application of Avogadro's hypothesis:
  - determination of atomicity of an elementary gas like H_2, Cl_2, O_2, and N_2
  - determination of relationship between molecular Weight & Vapour density
  - determination of gram molecular volume of all gases is equal to22.4 litres at NTP
  - determination of gram molecular weight of any gas contains same no of molecules
- Avogadro's number
- Determination of molecular weight by Victor Meyer's method
- Solving related simple numerical problems

2.4. Equivalent weight **[4 Hrs.]**

- Introduction
- Definition of equivalent weight of element, acid, base and salt
- Gram equivalent weight
- Relation between equivalent weight, atomic weight and valency

- Determination of equivalent weight of metals by
  - by hydrogen displacement method
  - by direct and indirect oxide method
- Solving related simple numerical problems

2.5. Simple mole concept [2 Hrs.]

- Introduction
- mole of an atom, mole of a molecule, molar volume
- Solving related simple numerical problems

Unit 3: System of Classification [36 Hrs.]

3.1. Acids, Bases and Salts [5 Hrs.]

- Introduction
- Characteristics of acid and base
- Arrhenius concept of acid and base and its limitations
- Lowry and Bronsted concept of acid and base and its limitations
- Conjugate acid and base pair
- Amphoteric nature of water
- Lewis concept of acid and base and its limitations
- Salt
- Types of salts (normal, acidic and basic)
- pH and POH and its mathematical expression
- pH scale
- prove that pH+ pOH=14
- Simple numerical problem on pH
- Buffer solution with examples and its types (No buffer mechanism is required)

3.2. Volumetric analysis [5 Hrs.]

- Introduction
- Titration, acidimetry and alkalimetry
- Indicator and their colour and selection of indicators in acidic and basic medium
- End point
- Standard solution, unknown solution, normal solution
- Preparation of normal solution, decimolar solution, molar solution
- Normality factor
- Different ways of expressing the concentration of solution:
  - normality, molarity, gram per litre and percentage
- Concept primary standard substance and secondary standard substances
- Primary standard solution and secondary standard solution
- Volumetric equation
- Solving related simple numerical problems

3.3. Electronic theory of valency [4 Hrs.]

- Introduction
- Valence electron and valence shell, core electron, inert gas
- Concept of lewis dot symbol
- Octet rule
- Basic assumptions of electronic theory of valency
- Chemical bond
- Types of chemical bond

- Definition of electrovalent bond (ionic bond), electrovalency and electrovalent compounds (ionic compound) and electrovalent compounds like NaCl, MgO, CaS, MgCl2 etc. with electron dot structure showing the formation of electrovalent compounds
- General properties of ionic compounds
- Definition of covalent bond, covalency and covalent compounds and covalent compounds H2, Cl2, O2, N2, CH4, H2O, NH3, CO2, CH4, C2H2 etc. with electrons dot structure showing the formation of covalent compounds
- General properties of covalent compounds
- Definition of coordinate covalent bond (dative bond), coordinate covalency and coordinate covalent compounds and coordinate covalent compounds like SO2, SO3, NH4+, H2SO4, NaNO3, CaCO3, Na2CO3, Na2SO4 etc. with electron dot structure to represent the formation of coordinate covalent compounds
- General properties of coordinate covalent compounds

3.4. Electrolysis [6 Hrs.]

- Introduction
- Definition
- Electrolytes
- Types of electrolytes:
  - weak and strong and non-electrolytes
- Faraday laws of electrolysis
- Faraday
- Relation between Faraday, chemical equivalent and electrochemical equivalent
- Application of electrolysis
- Solving related simple numerical problems
  - Corrosion
    - Types of corrosion (chemical corrosion, bio-corrosion, electrochemical corrosion)
    - Rusting of iron (no explanation required the theory of rusting)
    - Prevention of corrosion
  - Electrochemical series
    - Introduction
    - Applications of electrochemical series

3.5. Periodic table [4 Hrs.]

- Introduction
- Mendeleev's periodic table(law)
  - Main features of Mendeleev’s periodic table (Explanation of short and long periods, groups, sub groups, zero group, VIII group)
  - Advantages of Mendeleev’s periodic table (Systematic study of elements, prediction of new elements and correction of doubtful atomic weight)
  - Anomalies of Mendeleev’s periodic table (position of hydrogen, position of isotopes, position of anomalous pair of elements, position of lanthanides and actinides, separation of similar elements and grouping of dissimilar elements)
- Modern periodic table(law)
  - Advantages of Modern periodic table (Position of hydrogen, position of isotopes, position of anomalous pair of elements)

3.6. Oxidation and reduction [6 Hrs.]

- Introduction

- Classical and electronic concept of oxidation and reduction
- Classical and electronic concept of oxidizing agent (oxidant) e.g. O2, O3, halogens, HNO_3, MnO_2, $K_2Cr_2O_7$, $KMnO_4$ etc. and reducing agent (reductants)eg.H_2, HBr, HI, H_2S etc.
- Redox reaction (concept of split into oxidation half and reduction half)
- Oxidation and reduction go side by side
- Oxidation number
- General rule for assigning oxidation number
- Methods of calculation the oxidation number of an atom in a compound
- Oxidation and reduction in terms of oxidation number
- Auto-oxidation eg.H_2O_2, HNO_2, SO_2
- Balancing of simple chemical equation by oxidation number method

3.7. Atomic structure [6 Hrs.]

- Introduction
- Concept subatomic particles like electron, proton and neutron concerning their charge, mass and location in atom (no explanation of cathode ray experiment is required)
- Rutherford's α - rays scattering experiment and its observations
- Rutherford's atomic model and its drawbacks
- Postulates of Bohr's atomic model
- Atomic number and mass number
- Isotopes, isobars and isotones
- Bohr - Bury Scheme
- Aufbau principle
- Electronic Configuration of atoms (atomic number 1-30)
- Hund's rule of maximum multiplicity
- Quantum number and its types (principal, azimuthal, magnetic and spin)
- Pauli's exclusion principle

Tutorial

Unit 1: Practice on writing the significances of symbol, molecular formula, chemical equation, balancing of chemical equation by hit and trial and partial methods. [**4 Hrs.]**

Unit 2: Practice on application of Avogardo's hypothesis, relation between atomic weight, equivalent and valency, Solve numerical problem on atomic weight, molecular weight, equivalent weight and mole concept. **[8 Hrs.]**

Unit 3: Practice on different theories of acid, base, types of salt, pH and pOH value, preparation of different types of solution, Faradays laws of electrolysis, different types of chemical bond and their electron dot structure, Mendeleev's periodic table and modern periodic table, different concept of oxidation and reduction, balancing of chemical equation by oxidation number method, Rutherford's and Bohr's atomic model, electronic configuration of atoms, solve numerical problem on pH, volumetric analysis, electrolysis **[18 Hrs.]**

Evaluation Scheme

There will be questions covering all the chapters in the syllabus. The evaluation scheme for the questions will be as indicated as in the table below.

Unit	Chapter	Hours	Marks distribution
1	Symbol, formula, valency and radicals	3	4
	Chemical equation	5	4
2	Atom, molecule, Atomic weight	6	4
	Molecular weight	4	4
	Equivalent weight, mole concept	6	8
3	Acid, Base and salts	5	4
	Volumetric analysis	5	4
	Electronic theory of valency	4	4
	Electrolysis	6	4
	Periodic table	4	4
	Oxidation and reduction	6	8
	Atomic structure	6	8
	Total	**60**	**60**

Note: There may be minor deviation in marks distribution. Choice question can be asked from the same chapters.

Engineering Chemistry Practical I **[30hrs]**

1. Simple Glass Working [6hrs]
   a. cut the glass tube into three equal parts and round up their shape edges
   b. bore a hole through a cork
   c. bend the glass tubing into acute, obtuse and right angle
   d. draw a jet and capillary tube
   e. fit up a wash bottle
2. Neutralize dilute sulphuric acid with sodium hydroxide solution, and to recover crystals of sodium sulphate.
3. Obtain pure and dry precipitate of barium sulphate by treating dilute sulphuric acid with barium chloride solution. [2hrs]
4. Separate sand and copper sulphate crystals in pure and dry state from the mixture of sand and copper sulphate. [2hrs]
5. Separate sand and calcium carbonate in pure and dry state from the mixture of sand and calcium carbonate. [2hrs]
6. Prepare pure water from supplied impure water by distillation and to test the purity of the sample prepared. [2hrs]
7. Determine the equivalent weight of reactive metal by hydrogen displacement method. [2hrs]
8. Prepare primary standard solution of sodium carbonate and to use it to standardize an approximate decinormal acid solution. [2hrs]
9. Standardize given unknown acid (Approx N/10) solution by preparing standard alkali solution. (Expression of strength in different ways) [2hrs]
10. Standardize given unknown alkali (approximately N/10) solution with the help of by preparing standard acid solution. (Expression of strength in different ways) [2hrs]

11. Determine the pH of different unknown solution and using pH paper and universal indicator. [2hrs]
12. Investigate the composition of water by electrolysis by using Hofmann's apparatus. [2hrs]
13. Carry out conductivity experiments on solids and liquids ($CuSO_4$, Zn, Mg, Al, Fe, CCl_4, C_6H_6, C_2H_5OH) [2hrs]

Prescribed Books:

1. Foundations of Chemistry, Vol. 1, M.K. Sthapit and R.R. Pradhananga, Taleju Prakashan, Kathmandu
2. A Textbook of Engineering Chemistry, vol. I, Prakash Paudel, Siddthartha Publication, Kathmandu
3. Engineering Chemistry, Vol.1 M.L. Sharma, K. M. Shrestha, PN, Choudhary, Ekta Book, Kathmandu.
4. A Text book of Chemistry, Jha and Guglani, Surya publication, India
5. Fundamentals of Chemistry, K.R. Palak, Ratnapustak Bhandar, Kathmandu
6. Elementary Practical Chemistry, M.K. Sthpit, Taleju Prakashan, Kathmandu
7. Practical Engineering Chemistry for diploma level, Sumitri Bajracharya, Sabina Shrestha, Kathmandu Institute of Technology

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. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Drawing I
EG 1101 AR

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

Course description:
This course is designed to provide knowledge and skills on geometrical shapes, and its construction procedure, and interpretation of the views of objects by orthographic projection.

General objectives:
After the completion of this course students will be able to:
1. Handle drawing instruments and materials;
2. Identify Geometrical construction and shape;
3. Describe the scale, its type and construction;
4. Draw different types of engineering curves and
5. Draw and interpret the multi view of solids with scale and dimensioning.

Course Contents:

Theory

Unit 1: Introduction of Engineering Drawing: [2 Hrs.]
1.1 Types of drawing i.e. Engineering drawing and Artistic drawing and Engineering drawing define as Graphical language or universal language of engineering technical persons.
1.2 Introduction of drawing material i.e. drawing as drawing paper, drawing board, adhesive tape, pencil, eraser, sharpener etc.
1.3 Drawing tools like set square, compass divider etc.
1.4 Conventional line and its type and their uses and line weight
1.5 Drawing paper size and simple graphical symbols of civil works (at least 10 symbols).
1.6 Practical exercise of horizontal, vertical, inclined line using the Drawing tools and material with symbols and paper sizes. (Sheet No. 1)

Unit 2: Lettering, scales and dimensions: [4 Hrs.]
2.1. Lettering [1 Hr.]
2.1.1 Introduction of single stroke letter and their ratio between height and breadth.
2.1.2 Introduction of upper- and lower-case letter.
2.1.3 Introduction of Vertical and inclined (*italic*) letter (with inclined angle).
2.1.4 Practical exercise of letter writing using the guide lines of vertical and italic letter, (Sheet No 2).
2.2. Scale [1.5 Hrs.]
2.2.1 Introductions of scale and importance
2.2.2 Types of scale (full, reducing and enlarge)
2.2.3 Construction of scale using the representative factor.
2.3. Dimensioning [1.5 Hrs.]
2.3.1 Introduction of dimensioning.
2.3.2 Terminology of dimensioning i.e. Dimension line, extension line leaders line etc.
2.3.3 Termination of dimension line using arrowhead, slash and dot.

2.3.4 Dimensioning System-Aligned system, unidirectional system and base line dimensioning.
2.3.5 Principles of dimensioning.
2.3.6 Dimensioning pictorial views and orthographic view

Unit 3: Geometrical constructions: [2 Hrs.]

3.1. Geometric primitives (line, triangle, quadrilateral, regular polygons and circle and its name of its parts).

3.2. Division

3.2.1 Division of line – Bi-section of line, tri-section of line, division of line in any number of parts and division of the line in proportionally
3.2.2 Division of circle- Division of circle in three, four, five, six, seven and eight parts.
3.2.3 Division of angle- bi-section and trisection.
3.2.4 Division of triangle and trapezium in any number of equal parts of area.

3.3 Construction of triangle, square and regular polygons.
3.4 Inscribing and describing of circle in/on triangle or polygons.
3.5 Tangency- open and crossed line tangent, Arc tangent –internal, external and combined Arc tangent.

Unit 4: Engineering Curve: [1 Hr.]

Introduction of following curves:

4.1 Involutes
4.2 Spiral
4.3 Cycloid
4.4 Helices

Unit 5: Conic- Section: [1 Hr.]

5.1 Cone and its parts name
5.2 Introduction of sectional plane
5.3 Definition of conic section
5.4 Terminology of conic section after the cut by sectional plane (As ellipse, Parabola and Hyperbola)

Unit 6: Orthographic Projection:

6.1 Introduction of orthographic projection [2 Hrs.]

6.1.1. Theory of projection
6.1.2. Four quadrant, plane of projection
6.1.3. Introduction of co-ordinate or three-dimensional axis
6.1.4. System of orthographic projection
6.1.5. Making of orthographic view
6.1.6. Analysis of object and its view

6.2 Point and line projection [0.5 Hr.]

6.2.1. Notation system on HP, VP and PP
6.2.2. Location of point /line i, e. where it is and projection on plane of projection
6.2.3. Position of line: - Perpendicular to one plane and parallel to the other, parallel to both plane and inclined to one or both planes

6.3 Plane projection [0.5 Hr.]

6.3.1. Perpendicular to one plane and parallel to the other, perpendicular to both planes, perpendicular to one plane and inclined to the other

6.4 Projection of solids [2 Hrs.]

6.4.1. Orthographic projection of geometrical solid i.e. prism, cylinder and cone in simple Position. (simple position means axis- perpendicular to one plane (HP) and parallel to (VP) axis parallel to both planes

6.4.2. Orthographic projection of different model or work pieces. (at least 10 to 15 model pieces)

Practical (Class work sheet)

Sheet No 1: [6 Hrs.]

1. Draw horizontal, vertical, inclined (45°, 135°, 30°,60°,120°,150°,75°,105° degree) line and circle using the drawing tools**,**
2. Draw line type-visible (boarder), construction, dashed, (thick and thin), centre line, dimension, extension, leader line, section line, wavy line, continuous or short/break up line.

Sheet No 2: [6 Hrs.]

1. Practice free hand lettering exercise on upper and lower-case vertical letter using horizontal and vertical guide line (at least one set).
2. Practice free hand lettering exercise on upper and lower-case inclined letter with numerical using the horizontal and vertical guide line (at least one set).
3. Practice free hand lettering exercise on upper case letter using horizontal guide line of different height letter of 10 to 3mm height.
4. Draw symbols of general civil /electrical/ plumbing work.
5. Perform paper size scheduling work (A0 to A4 size).

Sheet No 3: [3 Hrs.]

1. Perform dimensional practicing exercise on aligned, unidirectional and base line dimension
2. Perform scale construction

Sheet No 4: [9 Hrs.]

1. Perform Line- bisection, trisection, line division any number of parts, with proportional division, circle division in three, four five, six, seven and eight parts, area of triangle and trapezoid division any number of equal parts.
2. Construct triangle by given sides, making equilateral triangle/square and regular Polygons (pentagon, hexagon, heptagon etc.)
3. Find the centre of Arc, making the circle touching the three points. Describing the circle on triangle, inscribe the circle in right angle triangle, Equilateral triangle, and scalene triangle and inscribing the circle in a sector.
4. Draw tangent from any point on circle, open and crossed line (belt) tangent. Arc Tangent-Internal, External and combined.

Sheet No 5: [6 Hrs.]

Draw:

1. Involutes- Line, triangle and circular involutes with tangent.
2. Spiral construction (mentioning the pole, vector radius, vector angle and Convolution)
3. Cycloid – Cyclonical curve with tangent
4. Helices- Cylindrical helix with pitch angle, conical helix.

Sheet No 6: **[6 Hrs.]**

Draw:

1. Ellipse-Concentric circle, oblong (Rectangle), Foci and Eccentricity method.
2. Parabola-Rectangle, offset, Tangent and Eccentricity method.
3. Hyperbola- Rectangle and Transverse axis method.

Sheet No 7: **[6hrs]**

Perform/draw:

1. Point projection- Point projection by given location by first and third angle projection (At least two exercise)
2. Line projection-perpendicular to one plane and parallel to other plane, parallel to both planes, parallel to both planes inclined to one or both planes.

Sheet No 8: **[3 Hrs.]**

Perform/draw**:**

1. Plane of projection-Perpendicular to one plane and parallel to other, perpendicular to both the planes, perpendicular to one plane and inclined to other (At least three exercise)

Sheet No 9: **[3 Hrs.]**

Perform/draw:

1. Solid projection-Orthographic projection of simple geometrical solid in first and third angle projection.

Sheet No 10: **[12 Hrs.]**

1. Analyze the view and draw orthographic projection of flat, inclined and circular surfaced model (At least 15 exercises) of the given objects.

References:

1. Luzzadar W. I Fundamental of Engineering drawing. Prentice-Hall of India
2. S. Bogolyubov and A. Voinov, Engineering drawing. Mir Publishers, Moscow.
3. S. K Bogolyubov, Exercises in Machine Drawing. Mir publishers, Moscow.
4. K. Venugopal Engineering Drawing and Graphics, New age international (p) Ltd. India
5. Gill. P. S. Engineering Drawing, S. K. Kataria and sons India.
6. M. B. Shah and B.C. Rana, Engineering Drawing, Pearson India,
7. N. D. Bhatta and Panchal V.M. Engineering Drawing Charotar publishing House India.

Computer Application
EG 1101 CT

Year: I **Total: 4 hours /week**
Semester: I **Lecture: 2 hour/week**
Tutorial: hours/week
Practical: 2 hours/week
Lab: hours/week

Course Description:
This course deals with the history of computer development, hardware components, Operating systems, Software applications, Computer networks and Internet. Students will learn classifications of computers, its architecture and software application installations, Peripheral devices installation, computer networks, internet and their use in various purposes.

Course Objectives:
On completion of this course the students will be able to:
1. Understand the basic architecture of Computer;
2. Identify major components of computer and their role;
3. Know the different Operating Systems like MS-DOS, Windows etc.;
4. Use the different Software applications and
5. Understand the basic networking and internet concept.

Course Contents:

Theory

Unit 1 Introduction to Computers: [2 Hrs.]
- 1.1 History of computers
- 1.2 Generation and type of computers
- 1.3 Computer hardware and software

Unit 2 Hardware Components: [6 Hrs.]
- 2.1 Major blocks of a digital computer
- 2.2 Input devices like keyboard, mouse, joystick, scanner, light pen etc.
- 2.3 Output devices like monitor, printer, plotter, sound card, speaker etc.
- 2.4 Central Processing Unit
- 2.5 Memory Unit: RAM, ROM, PROM, EPROM
- 2.6 Auxiliary storage devices:
  - Magnetic storage like floppy disk, hard disk, magnetic tape etc.
  - Optical storage like CD-ROM, DVD
  - Pen drive, flash memory card etc.

Unit 3 Introduction to Operating System Software: [6 Hrs.]
- 3.1 Importance and use of operating systems (OS)
- 3.2 Type of OS: MS-DOS, Windows, Unix, Linux
- 3.3 File management, device management and memory management by OS
- 3.4 MS-DOS system files: io.sys, msdos.sys, command.com, config.sys, autoexec.bat
- 3.5 MS-DOS internal and external commands
- 3.6 Windows Operating System: Graphical User Interface and windows environment, file/folder management
- 3.7 Linux: GNU open source operating system

Unit 4 Application Packages: [7 Hrs.]

4.1 Text Editors (edit in DOS, notepad in Windows, vi editor in Linux
4.2 Word Processing Package: Microsoft Word
4.3 Spreadsheet Package: Microsoft Excel
- Entering data
- Using formula
- Basic calculations
- Financial calculations
- Charts

4.4 Concept of Database management system
4.5 Database management package: Microsoft Access
4.6 Presentation Package: Microsoft PowerPoint

Unit 5 Utility Programs: [2 Hrs.]

5.1 Computer virus and its removal (antivirus programs)
5.2 Multimedia: Audio, Video and Graphics

Unit 6 Networks and Internet: [7 Hrs.]

6.1 Brief Introduction of LAN, MAN, WAN
6.2 Topologies: Bus, Ring and Star
6.3 Hub, Switch, Modem
6.4 Network Cabling
6.5 NIC
6.6 Network OS
6.7 Client and server concept
6.8 File and print sharing
6.9 Email/Internet
- World Wide Web (WWW)
- ISP
- Search Engines
- Internet Client: Web browsers like Internet Explorer, Netscape Navigator, Mozilla Firefox etc.,
- Email clients like Outlook Express, Netscape Mail etc.

Practical [30 Hrs.]

1. Identification of major components of computer and familiarization with keyboard and mouse. (1 session)
2. Internal and External DOS commands (1 session)
3. Windows Graphical User Interface and file/folder management (1 session)
4. Microsoft Word (2 sessions)
   a. Editing text
   b. Formatting document
   c. Creating tables
   d. Creating graphics and word art
5. Microsoft Excel (3 sessions)
   a. Editing worksheet
   b. Data formatting and manipulation
   c. Analysis of data (use of functions for calculation)
   d. Charts/Data presentation
   e. Import/Export data

6. Microsoft Access (2 sessions)
    a. Creating and manipulating data tables
    b. Query
    c. Forms/Reports
7. Using Multimedia and Internet/Email (1 session)
8. Creating effective presentation using Microsoft PowerPoint (1 session)
9. Project Work (3 sessions)

The students will be assigned (individually or in group) a project work based on Microsoft Excel or Access. The students are required to prepare a short report in MS Word and prepare a short presentation in PowerPoint.

Textbooks:

1. Rajaraman, "*Fundamentals of Computers*", Prentice-Hall of India

References:

1. B Ram, "*Computer Fundamentals*", Willey Eastern Publishers
2. S Saxena, "*A First Course in Computers"*, Vikash Publishing
3. Winn Rosch, "Harware Bible"
4. Noel Kalicharan, "Introduction to computer Studies", Cambridge Low Price Edition
5. P.K Sinha, "Computer Fundamentals"