CURRICULUM

DIPLOMA

Architecture Engineering

(Three-year program-semester system)

Council for Technical Education and Vocational Training
Curriculum Development and Equivalence Division
Sanothimi, Bhaktapur

2014
First Revision 2022

Contents

Introduction

Architecture Engineering is one of the prominent and popular disciplines within engineering. Many people in the developed countries, developing countries and under developed countries have given emphasis for the broader application of architecture/designing. This has contributed the world in the technological development and it has been creating wage and self-employment opportunities both in public and private sectors. This curriculum has been designed with the purpose of producing the middle level technical workforce equipped with knowledge and skills related to the field of architecture engineering to meet the demand of such workforce in the country to contribute in the national economic development of Nepal. The knowledge and skills incorporated in this curriculum will be helpful to fulfil the individual, societal/business as well national demand in the field of architecture engineering.

Rationale of Revision

Engineering is a progressive and constantly changing and a rapidly evolving industry, promising a wide range of opportunities. So, it was revised to apply that technology in the courses and make them more relevant. Most modern businesses and industry need people with specific skills and knowledge to support in the workplace.

Medium level workforce of architecture engineering is highly demanded in Nepali market so they are prioritized with change in workload in the revision. It needed to revise the curriculum to accumulate them according to the changing technology and link them with the world of work as well as higher studies. The rationales behind its revision are as follows:

- It crossed the 5 years maturity period of its implementation after its first revision in 2014 and similarly the implementing agencies/college have requested to revise this curriculum based on their teaching experiences.
- All Diploma level Engineering Courses' first and second semester subjects are re-adjusted and are common.
- The semester-wise re-adjustments of the existing subjects are felt necessary.
- It is needed to revisit its weightage in both theory and practical marks contents to make it more practical oriented.
- The technologies invented in this field seems necessary to be incorporated.

Curriculum Title

Diploma in Architecture Engineering

Aim

The program aims to produce mid-level technical human resource equipped with knowledge and skills in allied field of study.

Objectives

This curriculum has the following objectives:

1. Prepare mid-level competent workforce in the related field.
2. Prepare technicians who are capable of undertaking works in architecture engineering field as architecture engineering technicians under rural and urban development

planning, design and development of building construction and other civil infrastructures development related departments and sectors;

3. Help in meeting the demand of required architecture engineering technicians for the public and private infrastructure design and development of Nepal;
4. Prepare technical workforce who will demonstrate positive attitude and respect for the profession and socio-cultural values;
5. Create self-employment opportunities.

Group Size

The group size is maximum of 48.

Entry Qualification

- SLC pass or SEE or equivalent with minimum C Grade (2.0 Grade Point) in Mathematics and Science and 1.6 Grade Point or equivalent in English and as per the provisions mentioned in the admission guidelines of Office of the Controller of Examinations, CTEVT.
- Pre-diploma in related subject or equivalent with minimum 68.33%.
- Pass entrance examination administered by CTEVT.

Duration

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

Medium of Instruction

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

Pattern of Attendance

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

Teacher (Instructor) and Student Ratio

- Overall ratio of teacher and student must be 1:12 (at the institution level)
- 1:48 for theory and tutorial classes
- 1:12 for practical/demonstration
- 1:8 for bench work
- 75 % of the technical teachers must be full timer

Qualification of Instructional Staff

- The program coordinator should be a master's degree holder in the related subject area.
- The disciplinary subject related teachers should be a bachelor’s degree holder in the related subject area.
- The demonstrators should be a bachelor’s degree holder or diploma or equivalent with 3 years’ work experience in the related subject area.

- The foundational subject related teacher (refer to course codes SH and MG) should be master's degree holder in the related subject area.

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, performance checklists, textbooks etc.
- ***Non-project media materials:*** Displays, models, photographs, flipchart, poster, writing board etc.
- ***Projected media materials****:* Slides, Multimedia Projector.
- ***Audio-visual materials:*** Audiotapes, films, slide-tapes, videodisc, etc.
- ***Computer based instructional materials:*** Computer based training, interactive video etc.
- **Web-Based Instructional Materials** (Online learning)
- **Radio/Television/Telephone**
- **Education-focused social media platform**

Teaching Learning Methodologies

The methods of teaching will be a combination of several approaches, such as Illustrated talk, Lecture, Tutorial, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork, Report writing, Term paper presentation, Case analysis, Tutoring, Role-playing, Heuristic, Project work and Other Independent learning.

- Theory: Lecture, Discussion, Seminar, Interaction, Assignment, Group work.
- Practical: Demonstration, Observation, Guided practice, Self-practice, Project work.
- Internship: Industrial practice

Approach of Learning

There will be inductive, deductive and learner-centered approaches of learning.

Examination and Marking Scheme

A. Internal assessment

- There will be a fair formative evaluation for each subject both in theory and practical exposure.
- Each subject will have internal assessment (terminal tests) at regular intervals and students will get the feedback after each test.
- Weightage of theory and practical marks are mentioned in course structure.
- Formats for continuous assessment will be developed and applied by the evaluators of the related institute following the CTEVT guidelines.
- Students will be allowed to appear in the final examination only after completing the internal assessment requirements.

B. Final summative evaluation

- Weightage of theory and practical marks are mentioned in course structure.

- Students must pass in all subjects both in theory and practical for certification. If a student doesnot qualify in any subject for final evaluation, s/he will appear in the re-examination administered by CTEVT.

C. Requirement for final practical examination

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

D. Final practicum evaluation will be based on:

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

E. Pass marks:

- The students must secure minimum 40% marks in theory and 50% marks in practical in core subjects to pass the exam.
- Moreover, the students must secure minimum pass marks in the internal assessment and in the final examination of each subject to pass the respective subject.

Provision of Back Paper

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

Disciplinary and Ethical Requirements

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

Grading system

The following grading system will be adopted:

Grading	**Overall marks**
• Distinction:	80% and above

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

Certificate Awarded

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

Career Path

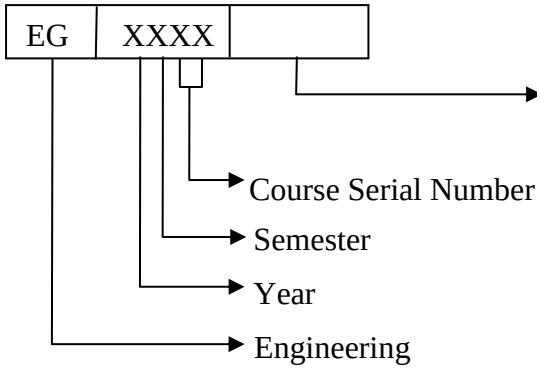
The graduates will be eligible for the position equivalent to Non- gazette 1st class/Level 5 (technical) as prescribed by the Public Service Commission of Nepal and other related agencies.

General Attitudes Required

A student should demonstrate following general attitudes for effective and active learning. Acceptance, Affectionate, Ambitious, Aspiring, Candid, Caring, Change, Cheerful, Considerate, Cooperative, Courageous, Decisive, Determined, Devoted, Embraces, Endurance, Enthusiastic, Expansive, Faith, Flexible, Gloomy, Motivated, Perseverance, Thoughtful, Forgiving, Freedom, Friendly, Focused, Frugal, Generous, Goodwill, Grateful, Hardworking, Honest, Humble, Interested, Involved, Not jealous, Kind, Mature, Open minded, Tolerant, Optimistic, Positive, Practical, Punctual, Realistic, Reliable, Distant, Responsibility, Responsive, Responsible, Self-confident, Self-directed, Self-disciplined, Self-esteem, Self-giving, Self-reliant, Selfless, Sensitive, Serious, Sincere, Social independence, Sympathetic, Accepts others points of view, Thoughtful towards others, Trusting, Unpretentiousness, Unselfish, Willingness and Work-oriented.

Subject Codes

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



Offering Departments:

AE: Automobile Engineering
AGE: Agricultural Engineering
AR: Architecture Engineering
BM: Biomedical Engineering
BM: Biomedical Equipment Engineering
CE: Civil Engineering
CT: Computer Engineering
EE: Electrical Engineering
EEX: Electrical & Electronics Engineering
EX: Electronics Engineering
GE: Geomatics Engineering
HE: Hydropower Engineering
IT: Information Technology
ME: Mechanical Engineering
MG: Management
MX: Mechatronics Engineering
RAE: Refrigeration & Air Conditioning Engineering
SH: Science and Humanities

Curriculum Structure
Diploma in Architecture Engineering

Year: I **Part: I**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	DISTRIBUTION OF MARKS							
									Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final		*Assmt. Marks	Final			
										Marks	Time (Hrs.)		Marks	Time (Hrs.)		
1	EG1101SH	Applied Nepali	4				4	4	20	80	3				100	*Continuous assessment
2	EG1102SH	Applied English	4				4	4	20	80	3				100	
3	EG1103SH	Engineering Mathematics I	4	2			6	4	20	80	3				100	
4	EG1104SH	Engineering Physics I	4	2		2	8	5	20	60	3	10	10	2	100	
5	EG1105SH	Engineering Chemistry I	4	2		2	8	5	20	60	3	10	10	2	100	
6	EG1101AR	Engineering Drawing I	1		4		5	3	0	0		60	40	4	100	
7	EG1101CT	Computer Application	2		2		4	3	10	40	1.5	30	20	3	100	
		Total	**23**	**6**	**6**	**4**	**39**	**28**							**700**	

Year: I **Part: II**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	DISTRIBUTION OF MARKS							
									Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final		*Assmt. Marks	Final			
										Marks	Time (Hrs.)		Marks	Time (Hrs.)		
1	EG1201SH	Engineering Mathematics II	4	2			6	4	20	80	3				100	*Continuous assessment
2	EG1202SH	Engineering Physics II	4	2		2	8	5	20	60	3	10	10	2	100	
3	EG1203SH	Engineering Chemistry II	4	2		2	8	5	20	60	3	10	10	2	100	
4	EG1201CE	Workshop Practice I	2		6		**8**	5	0	0		60	40	4	100	
5	EG1201AR	Engineering Drawing II	0		4		4	2	0	0		60	40	4	100	
6	EG1202CE	Applied Mechanics	3	2		2/2	6	4	20	60	3	20	0		100	
		Total	**17**	**8**	**10**	**5**	**40**	**25**							**600**	

Diploma in Architecture Engineering

Year: II **Part: I**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme DISTRIBUTION OF MARKS						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final		*Assmt. Marks	Final			
										Marks	Time (Hrs.)		Marks	Time (Hrs.)		
1	EG2101AR	Measured Drawing & Drafting			4		4	2				60	40	4	100	*Continuous assessment
2	EG2102AR	Computer Aided Drafting (CAD) I			4		4	2				60	40	4	100	
3	EG2103AR	Drafting I	1		6		7	4				90	60	4	150	
4	EG2104AR	Surveying I	2		4		6	4	10	40	1.5	60	40	4	150	
5	EG2105AR	Arts and Graphic I	1		6		7	4				90	60	4	150	
6	EG2106AR	Building Materials- I	4				4	4	20	80	3				100	
7	EG2107AR	Introduction to Architecture	2		2/2		3	3	10	40	1.5				50	
8	EG2108AR	Workshop Practice II			4		4	2				60	40	4	100	
		Total	**10**		**29**		**39**	**25**							**900**	

Year: II **Part: II**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme DISTRIBUTION OF MARKS						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final		*Assmt. Marks	Final			
										Marks	Time (Hrs.)		Marks	Time (Hrs.)		
1	EG2201AR	Arts and Graphic II	1		6		7	4				90	60	4	150	*Continuous assessment
2	EG2202AR	Building Materials II	3				3	3	20	80	3				100	
3	EG2203AR	Computer Aided Drafting (CAD) II			4		4	2				60	40	4	100	
4	EG2204AR	Surveying II	2		4		6	4	10	40	1.5	60	40	4	150	
5	EG2205AR	Drafting II	1		6		7	4				90	60	4	150	
6	EG2206AR	Architectural Model Making I			4		4	2				60	40	4	100	
7	EG2207AR	Building Construction- I	2		3		5	4	10	40	1.5	30	20	3	100	
8	EG2208AR	Building Design-I	1		2		3	2				30	20	3	50	
		Total	**10**		**29**		**39**	**25**							**900**	

Diploma in Architecture Engineering

Year: III **Part: I**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme DISTRIBUTION OF MARKS						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final Marks	Final Time (Hrs.)	*Assmt. Marks	Final Marks	Final Time (Hrs.)		
1	EG3101AR	Construction Management	4				4	4	20	80	3				100	*Continuous assessment
2	EG3102AR	Architectural Model Making II	1		5		6	4				60	40	4	100	
3	EG3103AR	Building services, I	2		4		6	4	10	40	1.5	60	40	4	150	
4	EG3104AR	Steel and Timber Structures	3		2/2		4	4	20	80	3				100	
5	EG3105AR	Building Construction II	2		4		6	4	10	40	1.5	60	40	4	150	
6	EG3106AR	Building Design II	1		4		5	3				60	40	4	100	
7	EG3107AR	Working Drawing I	1		6		7	4				90	60	6	150	
		Total	**14**		**24**		**38**	**27**							**850**	

Year: III **Part: II**

S.N.	Code No.	Subject	Teaching Scheme						Examination Scheme DISTRIBUTION OF MARKS						Total Marks	Remarks
			Mode				Weekly Hours	Credit Hours	Theory			Practical				
			L	T	P	Lab			*Assmt. Marks	Final Marks	Final Time (Hrs.)	*Assmt. Marks	Final Marks	Final Time (Hrs.)		
1	EG3201AR	Building service II	2		3		5	4	10	40	1.5	30	20	3	100	*Continuous assessment
2	EG3202AR	Reinforced Concrete Structures	2		2		4	3	10	40	1.5				50	
3	EG3203AR	Computer Aided Drafting (CAD) III	1		3		4	3				30	20	3	50	
4	EG3204AR	Building Construction III	2		4		6	4	10	40	1.5	60	40	3	150	
5	EG3205AR	Working Drawing II			6		6	3				90	60	6	150	
6	EG3206AR	Quantity surveying	2		2		4	3	10	40	1.5	30	20	3	100	
7	EG3201MG	Entrepreneurship Development	3		2		5	4	20	60	3	10	10	2	100	
8	EG3207AR	Project Work			6		6	3				60	40	4	100	
		Total	**12**		**28**		**40**	**27**							**800**	

First Year (First and Second Semesters)

[See Separate Curriculum]
([Year I Part I and Year I Part II) Engineering All

Second Year/ First Part

S.N.	Code No.	Subjects
1	EG2101AR	Measured Drawing & Drafting
2	EG2102AR	Computer Aided Drafting (CAD) I
3	EG2103AR	Drafting I
4	EG2104AR	Surveying I
5	EG2105AR	Arts and Graphic I
6	EG2106AR	Building Materials- I
7	EG2107AR	Introduction to Architecture
8	EG2108AR	Workshop Practice II

Measured Drawing & Drafting

EG2101AR

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

Part: I **Lecture: hours/week**

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This course intends to provide knowledge and skills on freehand sketch of any objects, measurement instruments, drawing of different objects in different scale in metric & imperial units, freehand sketch of modern & traditional building, measurement of the same building, dimensioning the sketch & producing the drawing of the same building into the scale in good drafting.

Course Objectives:

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

1. Explain measured drawing, and drafting techniques in different units.
2. Define technical terms of building.
3. Calculate the area calculation of buildings & site.
4. Convert the unit's conversion and values into – mm., cm., m., km., inch, foot, ropani, aana, paisa, dam, hectar, bigha, acre, kattha, dhur, sq.m., sq.ft.
5. Produce the complete set of drawings of any building by using different techniques of measurements.

Course Contents:

Practical

Sheet 1: Sketch out the table, chair or bench (select any one) **[4 Hrs.]**

a. Plan
b. All side elevations
c. Sections
d. Sectional details

Sheet 2: Taking measurements, dimensioning & draw to scale in studio of Sheet – 1 **[8 Hrs.]**

Sheet 3: Sketch out the existing modern Residence Building or modern public building. **[8 Hrs.]**

a. Plans
b. All side elevations
c. Sections
d. Sectional details
e. Details (Doors, Windows and Staircase)

Sheet 4: Taking measurements, dimensioning & draw to scale in studio of unit. **[14 Hrs.]**

Sheet 5: Sketch out the existing Traditional Gazebo or residence or public building or Temple. **[6 Hrs.]**

a. Plans
b. All side elevations
c. Sections
d. Sectional details
e. Details (Doors, Windows and Staircase)

Sheet 6: Taking measurements, dimensioning & draw to scale in studio of unit - 5 **[20 Hrs.]**

NOTE: Check & verify the missing details in the drawing according to the field and complete the drawing, then submit to teacher by making profile very neat, clean & attractive

References:

1. Rolf Janke, Architectural Models, Architectural book publishing co.D.D.Adrews, Bill Blake, Measured & Drawn, English Heritage.
2. Piter shallow, Bavid walt, Robert Asthon, Measurement & recording of historic building London donhead publishers.
3. Technical drawings:
    - Frederick E. Giesecke
    - Alna Michel
    - Henry cecil spencer
    - Iran Levoy Hill
    - John Thomas Dygdon
    - James E. Novak

Computer Aided Drafting (CAD) I

EG2102AR

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

Part: I **Lecture: hours/week**

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This course intends to provide knowledge and skills on drawing basic two-dimensional drawings as geometrical shapes and curves through computer aided drafting (Auto CAD)

Course Objectives:

After completion of this course students will be able to:

1. Introduce Auto CAD program.
2. Use terminologies.
3. Use the functions and commands of Auto CAD program.
4. Create and modify basic two-dimensional geometrical shapes & curves.

Course Contents:

Practical: **[60 Hrs.]**

Unit 1. Open and start new drawings **[4 Hours]**

1.1. Open Auto CAD screen

1.2. Set up new drawing

- 1.2.1. Set up a drawing starting from scratch using wizard
- 1.2.2. Set up a working area through LIMITS
- 1.2.3. Set up a working area through MVSETUP

1.3. Open/save/save as the drawing

Unit 2. Draw 2D coordinate systems in Auto CAD

2.1. Draw commands Using co-ordinate systems. **[12 Hrs.]**

- 2.1.1. Absolute Coordinate System
- 2.1.2. Relative Coordinate system
- 2.1.3. Polar Coordinate system

2.2. Draw different types of geometric shapes and constructions using draw and modify commands: **[20 Hrs.]**

- 2.2.1. Draw commands: Line, Circle, Rectangle, polyline, arc, ellipse, polygon, construction line
- 2.2.2. Modify commands: move, copy, rotate, trim, mirror, array, stretch, scale, join, break, align

2.3. Draw Simple one room building. Using draw and modify commands. **[24 hrs.]**

- 2.3.1. Draw floor plan
- 2.3.2. Draw four side elevations
- 2.3.3. Draw section

References:

1. Singh, V.P. (2019). *AutoCAD2019.* Computech Publications Ltd.
2. Omura, G; Benton, B.C. (2015). *Mastering AutoCAD 2016 auto Autocad LT 2016.* Sybex

Drafting I
EG2103AR

Year: II **Total: 7 hours /week**
Part: I **Lecture: 1 hours/week**
Tutorial: hour/week
Practical: 6 hours/week
Lab: hours/week

Course Description:
This course intends to deals drafting equipment's, simple drawings, drafting techniques, demonstration and handling of drawing. This course provides knowledge and skills measurement instruments, drawing of different objects in different scale (use of different scales), measurement of buildings and dimensioning in the sketch and producing the drawing of the same buildings into the scale.

Course Objectives:
After the completion of this course students will be able to:
1. Explain the fundamentals of architectural drawing techniques and skills.
2. Draw Different types of lines, line weight, convention for lines, materials and features, textures of different materials
3. Develop good drafting and lettering techniques
4. Develop skills on enlarging and reducing scales
5. Visualize the concept of tracing and visualization techniques.
6. Produce the complete set of drawings of existing building by using different techniques of measurement
7. Reproduce geometrical and building drawings at different scales
8. Trace in pencil and ink medium

Course Contents:

Theory

Unit 1: Introduction to Drafting and its technique **[2 Hrs.]**
- 1.1. Introduction to Drafting
- 1.2. Different types of lines and their effects
- 1.3. Different types hatching

Unit 2: Architectural lettering and dimensioning **[2 Hrs.]**
- 2.1. Freehand and Instrumental Lettering
- 2.2. Dimensioning in simple geometrical objects

Unit 3: Preliminary tracing of given drawings **[2 Hrs.]**
- 3.1. Introduction to Tracing
- 3.2. Tracing Building and its components

Unit 4: Architectural Scale (Metric and feet) **[6 Hrs.]**
- 4.1. Introduction to scales (metric and feet)
- 4.2. Use of scales to draw building and its components

Unit 5: Tracing with Ink medium from unit 4 **[3 Hrs.]**

5.1. Introduction to Ink medium

5.2. Use of ink medium to draw building and its components

Practical: **[90 Hrs.]**

Unit 1: Drafting techniques and method in common practice **[6 Hrs.]**

1.1. Sheet 1: Prepare the standard drawing sheet: A_0 , A_1 , A_2 , A_3 , & A_4 and Draw border line in the drawing sheet along with the sheet title **[2 Hrs.]**

1.2. Sheet 2: Draw different types of lines and effects (thick, thin, dark, light, center line, break line, hidden line, cutting plane lines. **[2 Hrs.]**

1.3. Sheet 3: Draw different types hatching to show texture of different materials (stone, sand, timber, glass, metal, concrete, brick, earth, marble, liquid)**[2 Hrs.]**

Unit 2: Architectural lettering and dimensioning: **[6 Hrs.]**

2.1. Sheet 4: Write Nepali lettering by freehand and using guide line. **[2 Hrs.]**

2.2. Sheet 5: Write English lettering by freehand and instrumental letter writing. **[2 Hrs.]**

2.3. Sheet 6: Draw simple geometrical objects and practice dimensioning exercise. **[2 Hrs.]**

Unit 3: Preliminary tracing of given drawings **[12 Hrs.]**

3.1. Sheet 7: Trace building plan (ground and first floor terrace and site plan), Complete with dimensions and lettering. **[4 Hrs.]**

3.2. Sheet 8: Trace the 4 sides 'elevation of building and 2 sections (cross section and longitudinal roof section), Complete with dimensions and lettering. **[4 Hrs.]**

3.3. Sheet 9: Trace the elevation of the window including elements details, Complete with dimensions and lettering. **[4 Hrs.]**

Unit 4: Architectural Scale (Metric and feet) **[36 Hrs.]**

4.1. Sheet 10 and 11: Redraw unit 4 using different scales in metric [**12 Hrs.]**

4.2. Sheet 12 and 13: Redraw unit 4 using different scales in Feet **[12 Hrs.]**

4.3. Sheet 14: Redraw Opening Details in different scales **[12 Hrs.]**

Unit 5: Tracing with Ink medium from unit 4 **[30 Hrs.]**

5.1. Sheet 15 and 16: Trace Sheet 10 and 11 using ink medium **[10 Hrs.]**

5.2. Sheet 16 and 17: Trace 12 and 13 using ink medium **[10 Hrs.]**

5.3. Sheet 18: Trace 14 using ink medium **[10 Hrs.]**

References:

1. George K.Stegman, Harry J.Stegman, Architectural Drafting Printed in USA by American Technical Society, 1966.
2. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. John Wiley & Sons. 2. Martin, L. C. (1970). Architectural Graphics. 2nd Ed. Macmillan Pub Co.

3. Lockard, W. K. (1992). Drawing as a Means to Architecture. 6th Ed. New York: Van Nostrand Reinhold Company. 5. Zell, Mo. (2008). The Architectural Drawing Course. 1st Ed. Thames and Hudson.
4. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.
5. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken:John Wiley & Sons.
6. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D.Van Nostrand, Company Inc.
7. Halse, A. O. (1972). Architectural rendering; the techniques of contemporary presentation. 2nd Ed. New York: McGraw-Hill.

Surveying I
EG2104AR

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

Course Description:
This course focuses on familiarization of different surveying techniques and handling of surveying equipment. The different surveying techniques include linear, angular, vertical measurements, and plotting skills.

Course Objectives:
After completing this course, the student will able to:
1. Explain the principles of surveying.
2. Explain the distance measurement techniques.
3. Differentiate the distance measurement on horizontal and sloping ground.
4. Handle the Instruments used in leveling.
5. Apply basic surveying techniques and plotting of plan and map.

Course Contents:

Theory

Unit 1. Introduction **[4 Hrs.]**
- 1.1. History and Definition of surveying
- 1.2. Primary division of survey
- 1.3. Principles of surveying
- 1.4. Classifications according to discipline, nature and instruments used
- 1.5. Scales and their types
- 1.6. Maps and Conventional Symbols

Unit 2. Accuracy and Errors **[2 Hrs.]**
- 2.1. Definition of accuracy precisions
- 2.2. Types and sources of errors and errors

Unit 3. Linear Distance Measurement **[6 Hrs.]**
- 3.1. Horizontal distance
- 3.2. Different methods of distance measurement on horizontal and sloping ground
- 3.3. Equipment for direct chaining
- 3.4. Ranging and its methods
- 3.5. Errors in distance measurement and Precision in distance measurement
- 3.6. Tape correction

Unit 4. Chain Surveying **[4 Hrs.]**

4.1. Principles of chain surveying
4.2. Perpendicular offsets, Oblique offsets, Setting 3.4.5 right angle
4.3. Procedures of chain surveying
    4.3.1. Reconnaissance survey
    4.3.2. Selection of survey stations
    4.3.3. Referencing and marking of stations
    4.3.4. Double line field Book
4.4. Obstacles in chaining
4.5. Detailing and Plotting

Unit 5. Compass Surveying **[6 Hrs.]**

5.1. Introduction
5.2. Technical Terms Meridians, Bearings, Magnetic declination
5.3. System of Bearings (WCB QB system, Fore bearing and Back bearing)
5.4. Prismatic and Surveyor's compass
5.5. Calculation of angles from bearing and bearing from angles,
5.6. Angular error, Angular precision
5.7. Local attraction, detection and correction of local attraction

Unit 6. Leveling **[8 Hrs.]**

6.1. Definition and objectives
6.2. Classification of leveling according to principles
6.3. Technical terms used in leveling
6.4. Instruments used in leveling
6.5. Temporary adjustment of level
6.6. Two peg tests
6.7. Methods of booking and reducing level
6.8. Classification of direct leveling
    6.8.1. Simple leveling
    6.8.2. Fly leveling
    6.8.3. Reciprocal leveling
    6.8.4. Profile leveling and Cross sectioning
    6.8.5. Precise leveling
6.9. Errors in leveling

Practical:

1. Perform linear distance measurement on plane and sloping ground. **[10 Hrs.]**
2. Perform chain triangulation and detailing. **[15 Hrs.]**
3. Perform compass traversing and detailing. **[15 Hrs.]**
4. Perform Leveling **[20 Hrs.]**
    4.1. Two peg tests
    4.2. Fly Leveling

4.3. Profile leveling and Cross sectioning

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	4	5
2	Accuracy and Errors	2	3
3	Linear Distance Measurement	6	8
4	Chain Surveying	4	5
5	Compass Surveying	6	8
6	Leveling	8	11
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Dr. BC Punmia, " Surveying " Vol I, Laxmi Publication New Delhi
2. SK Duggal, " Surveying" Vol I and II,Tata MC Graw Hill Publishing
3. N Basnet and M Basnet, " Basic Surveying – I", Benchmark Education Support Pvt. Ltd., Tinkune Kathmandu

Arts and Graphics, I

EG2105AR

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

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

Tutorial: hour/week

Practical: 6 hours/week

Lab: hours/week

Course Description:

This course is designed to equip the students with knowledge and skills of freehand drawings; compositions presentation techniques in the graphical manner. It mainly deals with elements of form, interpretation of graphical form, tone and principle of composition.

Course Objectives:

After completion of this course students will be able to:

1. Introduce freehand drawing and compositions
2. Familiarize with drawing presentation techniques
3. Draw lines, shapes and forms
4. Interpenetrate various geometrical forms
5. Make on arrangement of tones and tonal chart
6. Make a composition of principles of designs and elements

Course Contents:

Theory

Unit 1. Arts and Graphics **[4 Hrs.]**

1.1. Introduction
1.2. Importance of the study
1.3. Scope of the study
1.4. Natural forms
1.5. Artificial/manmade forms

Unit 2. Element of forms **[3 Hrs.]**

2.1. Geometrical forms
2.2. Plane forms
2.3. Solid forms
2.4. Prismatic forms
2.5. Pyramidic forms

Unit 3. Interpenetration and Composition **[3 Hrs.]**

3.1. Simple forms of interpenetration
  3.1.1. Two solids of Interpenetration
  3.1.2. One polyhedron and one solid of revolution

Unit 4. Tone **[2 Hrs.]**

4.1. Light, medium and dark tones
4.2. Flat and graded tones

Unit 5. Principles of composition [3 Hrs.]

5.1. Compositional development of presentation (Texture, trees, human figures, and vehicles)
5.2. Proportion, Balance, Rhythm
5.3. Unity, point of emphasis, Harmony
5.4. Contrast, monotony

Practical: [90 Hrs.]

Unit 1. Arts and Graphics (Pencil Work) [8 Hrs.]

1.1. Sheet 1: Draw free hand lines (horizontal, vertical, different angles, zigzag) **[2 Hrs.]**
1.2. Sheet 2: Draw same as sheet 1 using instruments **[2 Hrs.]**
1.3. Sheet 3: Draw still life composition **[2 Hrs.]**
1.4. Sheet 4: Draw freehand simple geometrical 2D forms of Circle, Square, Rectangular, Triangle. **[2 Hrs.]**

Unit 2. Element of forms [14 Hrs.]

2.1. Sheet 5: Draw freehand Natural form and artificial form. **[2 Hrs.]**
2.2. Sheet 6: Draw Geometrical forms **[4 Hrs.]**
2.3. Sheet 7: Draw Plane forms and Solid forms **[4 Hrs.]**
2.4. Sheet 8: Draw Prismatic forms and Pyramidic forms **[4 Hrs.]**

Unit 3. Interpenetration and Composition [12 Hrs.]

3.1. Sheet 9: Compose and draw Simple forms of interpenetration. **[4 Hrs.]**
3.2. Sheet 10: Compose and draw two solids of Interpenetration. **[4 Hrs.]**
3.3. Sheet 11: Compose and draw one polyhedron and one solid of revolution. **[4 Hrs.]**

Unit 4. Tone [20 Hrs.]

4.1. Sheet 12: Make a tonal chart of 9 grades. **[5 Hrs.]**
4.2. Sheet 13: Draw the given textures in the drawing paper. **[5 Hrs.]**
4.3. Sheet 14: Draw trees, human figures, vehicles, landscape elements. (Water bodies, background hatching, walkway, roadway, clouds etc.) **[5 Hrs.]**
4.4. Sheet 15: Render exercise with light, shade and shadow in Sphere, Cube, Cylinder. **[5 Hrs.]**

Unit 5. Principles of composition [36 Hrs.]

5.1. Sheet 16: Compose and Develop presentation drawing (Texture, trees, human figures, and vehicles) **[6 Hrs.]**
5.2. Sheet 17: Compose and Draw forms with Proportion, Balance, and Rhythm. **[6 Hrs.]**
5.3. Sheet 18: Compose and Draw forms with Unity, point of emphasis, Harmony. **[6 Hrs.]**
5.4. Sheet 19: Compose and Draw forms with contrast, monotony. **[6 Hrs.]**
5.5. Sheet 20: Redraw Given Plan and Elevations of furniture. **[6 Hrs.]**
5.6. Sheet 21: Draw a composition of point of interest in interior furniture. **[6 Hrs.]**

References:

1. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.

2. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken:John Wiley & Sons.
3. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D.Van Nostrand, Company Inc.
4. Halse, A. O. (1972). Architectural rendering; the techniques of contemporary presentation. 2nd Ed. New York: McGraw-Hill.

Building Materials-I

EG2106AR

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

Part: I **Lecture: 4 hours/week**

Tutorial: hour/week

Practical: hours/week

Lab: hours/week

Course Description:

This course is designed to impart basic knowledge with physical and chemical properties on most of the commonly used building materials related to the construction. Diploma holders in Architectural assistantship are supposed to prepare working drawings of buildings. The basic knowledge of building materials and their behavior under varied climatic conditions is very essential from the point of building construction.

Course Objectives:

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

1. Familiarize with the commonly used building materials.
2. Use application methods in building construction works.
3. Analyze the physical and chemical characteristics and properties of various building materials.

Course contents:

Theory

Unit 1. Introduction to Building Materials [4 Hrs.]

1.1. Introduction
1.2. Scope of building material
1.3. Types of building material
  1.3.1. Natural material
  1.3.2. Manmade material

Unit 2. Clay [6 Hrs.]

2.1. Introduction
2.2. Physical and chemical properties of clay
2.3. Types of Clay and its characteristics
2.4. Use of clay as a building material
2.5. Bricks, mortar, tile, Mud plaster

Unit 3. Brick [14 Hrs.]

3.1. Introduction
3.2. Molding of Bricks
3.3. Classification of Bricks and its properties
  3.3.1. Sundried Bricks
  3.3.2. Backed Bricks
3.4. Types of Bricks
  3.4.1. Handmade traditional bricks: Types and size, Uses, Names
  3.4.2. Machine made building: Standard size, Classification, Uses of Bond

Unit 4. Rocks/Stones **[12 Hrs.]**

4.1. Introduction
4.2. Formation and geological classifications of rock
4.3. Source of building stones
4.4. Quarrying, dressing of building stones.
4.5. Different types of stones and their uses in engineering field
4.6. Characteristics of major building stones (physical & chemical)
4.7. Availability and sources of stones in the country.
4.8. Artificial stones and their properties (mosaic & terrazzo)
4.9. Comparison between natural and artificial stones

Unit 5. Timber **[10 Hrs.]**

5.1. Introduction
5.2. Types of timber
  5.2.1. Evergreen: Introduction, uses
  5.2.2. Deciduous: Introduction, uses
  5.2.3. Coniferous: Introduction, uses
5.3. Joints of timber
5.4. Use of timber as a building material
5.5. Treatments of timber before use
  5.5.1. Seasoning
  5.5.2. Chemical treatment
  5.5.3. Water treatment
  5.5.4. Storage

Unit 6. Bamboo **[10 Hrs.]**

6.1. Introduction
6.2. Growth of bamboo
6.3. Types of bamboo
6.4. Characteristics of bamboo
6.5. Treatments of Bamboo before use
  6.5.1. Seasoning
  6.5.2. Chemical treatment
  6.5.3. Water treatment
  6.5.4. Storage
6.6. Use of bamboo as a building material

Unit 7. Daub **[4 Hrs.]**

7.1. Introduction
7.2. Mixture and fermentation of daub
7.3. Application of daub as a wall plaster

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***

1	Introduction to Building Materials	4	5
2	Clay	6	8
3	Brick	14	20
4	Rocks/Stones	12	16
5	Timber	10	13
6	Bamboo	10	13
7	Daub	4	5
	Total	**60**	**80**

* There could be minor deviation in mark distribution.

References:

1. Acharya, B.M. 1988. Identification of Bamboo and its uses in Pokhara Valley. Tribhuvan University Institute of Forestry, Central Campus.
2. Bonapace, C., Sestini V. 2003. Traditional Materials and Construction Technologies used in the Kathmandu Valley. UNESCO, Peris.
3. Dahal R.K., 2006, Geology of Nepal, published in personal home page www.ranjan.net.np.
4. Duggal, S.K. 2019. Building Materials. New Age International Publishers, New Delhi.
5. *Zhang H. 2016. Building materials in Civil Engineering.* Woodhead Publishing.
6. Karki B.R., Sing, S. 2068. Conservation Methodology. Mira Karki, Kathmandu.
7. Paudyal, P.P. 1992. Bamboos, field manual for community and private forestry in Nepal. Part II. HMG/FAO/UNDP.
8. Timilsina, H.R. 2012. Rocks and Minerals of Nepal. ISBN-13: 978-9937249638, Kathmandu.

Introduction to Architecture

EG2107AR

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

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

Tutorial: hour/week

Practical: 2/2 hours/week

Lab: hours/week

Course Description:

This course intends to deal with introduction of Architecture and its relation with society, culture, religion, technology, material, and built environment to students. It also helps in understanding the profession of architecture and its relation with allied profession.

Course Objectives:

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

1. Identify the role of architecture in Nepal and the career opportunities.
2. Recognize the allied profession of architecture
3. Relate Architecture, built environment and the society and culture.

Course Contents:

Theory

Unit 1. Introduction to Architecture [3 Hrs.]

1.1. Definition
1.2. Importance of architecture
1.3. Scope and field of Architecture
1.4. Benefits of Architecture
1.5. Involvement of Allied Professions in Architecture

Unit 2. Historical background of Architecture and its evolution [6 Hrs.]

2.1. Athens
2.2. Egypt
2.3. Roman
2.4. Indian
2.5. Chinese

Unit 3. Nepalese Architecture [6 Hrs.]

3.1. Lichhavi Period
3.2. Malla Period
3.3. Shah Period
3.4. Modern Period

Unit 4. Different Aspects of Architecture [6 Hrs.]

4.1. Social, culture, religious, economic and environmental aspects of the architecture of Terai
4.2. Social, culture, religious, economic and environmental aspects of the architecture of Hills
4.3. Social, culture, religious, economic and environmental aspects of the architecture of Upper Hill

Unit 5. Material and technology **[3 Hrs.]**

5.1. Material and Technology of different temples
5.2. Material and Technology of different temples

Unit 6. Building Bye-laws **[3 Hrs.]**

6.1. FAR (Floor Area Ratio)
6.2. Light Plane
6.3. ROW (Right of Way)
6.4. Land Use and zoning etc.

Unit 7. Building Code **[3 Hrs.]**

7.1. Definition
7.2. Importance
7.3. Use

Field visit: Conduct a 5 days Field visit to Vernacular Architectural site and collect the local or national documents (codes). Prepare a report incorporating the given contents and present in the class. **[15 Hrs.]**

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction to Architecture	3	4
2	Historical background of Architecture and its evolution.	6	8
3	Nepalese Architecture.	6	8
4	Different Aspects of Architecture.	6	8
5	Material and technology	3	4
6	Building Bye-laws	3	4
7	Building Code	3	4
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Francis D.K, Ching, James, F., Eckler, (2012), Introduction to Architecture, Wiley.
2. Colquhoun A., Oxford University Press.
3. Francis D.K. Ching, Architecture: Form, Space, & Order -
4. Government of Nepal, Building Bye-Laws of Kathmandu, 2064 BS.

Workshop Practice II

EG2108AR

Year: II **Total: 4 hours /week**
Part: I **Lecture: hours/week**
Tutorial: hour/week
Practical: 4 hours/week
Lab: hours/week

Course Description:
This module focuses on bricklaying and carpentry works. Assignment in this module enhances practical knowledge about construction techniques of different types of brick laying and carpentry.

Part 1 (Brick Laying)

Year: II **Total: 2 hours /week**
Part: I **Lecture: hours/week**
Tutorial: hour/week
Practical: 2 hours/week
Lab: hours/week

Course Description:
This module focuses on familiarization of brick laying theory and practical parts and its standard requirement to be used on to-days construction.

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

1. Describe various types of bricklaying
2. Identify major operation related to civil engineering works
3. Handle tools and equipment required for bricklaying
4. Identify use and care of tools
5. Apply the safety rules

Practical: **[30 Hrs.]**

Project 1. Identify tools/equipment **[2 Hrs.]**

1.1. Enumerate/ handle tools/equipment/materials related to bricklaying.

Project 2. Build Stretcher Bond **[4 Hrs.]**

2.1. Prepare workshop floor area and set out the work area
2.2. Prepare/handle/spread mortar with trowel
2.3. Lay stretcher bond wall making 1.5 m long and 6 courses high true to horizontal and vertical line and level properly.

Project 3. Construct English Bond wall **[3 Hrs.]**

3.1. Prepare workshop floor area and set out the work area
3.2. Prepare/handle/spread mortar with trowel

3.3. Build English bond wall 1 brick thick (9") up to7 courses high and ending at 1.5 m length true to horizontal and vertical line and level properly.

Project 4. Build Flemish Bond Wall [3 Hrs.]

4.1. Prepare workshop floor area and set out the work area
4.2. Prepare/handle/spread mortar with trowel
4.3. Build Flemish bond wall 1 brick thick (9") up to 7courses high and ending at 1.5 m length true to horizontal and vertical line and level properly

Project 5. Construct T-junction 1 Brick Thick wall in English bond [3 Hrs.]

5.1. Prepare workshop floor area and set out the work area
5.2. Prepare/handle/spread mortar with trowel
5.3. Build a T-junction 1 brick thick main wall with 1.5 m length in English bond and partition wall with 1 m length in stretcher bond up to 6 courses high.

Project 6. Construct T-junction 1 Brick Thick wall in Flemish bond [3 Hours]

6.1. Prepare workshop floor area and set out the work area
6.2. Prepare/handle/spread mortar with trowel
6.3. Build a T-junction 1 brick thick main wall with 1.5 m length in Flemish bond and partition cross wall with 1m length in stretcher bond up to 6 courses high.

Project 7. Construct a cross- junction 1 brick thick main wall in English bond [3 Hrs.]

7.1. Prepare workshop floor area and set out the work area
7.2. Prepare/handle/spread mortar with trowel
7.3. Build a cross-junction 1 brick thick main wall with 1.5 m length in English bond and partition cross wall with 1 m length both side in stretcher bond up to 6 courses high.

Project 8. Construct a cross- junction 1 brick thick main wall in Flemish bond [3 Hrs.]

8.1. Prepare workshop floor area and set out the work area
8.2. Prepare/handle/spread mortar with trowel
8.3. Build a cross-junction 1 brick thick main wall with 1.5 m length in Flemish bond and partition cross wall with 1 m length both side in stretcher bond up to 6 courses high.

Project 9. Build a cavity wall [3 Hrs.]

9.1. Prepare workshop floor area and set out the work area
9.2. Prepare/handle/spread mortar with trowel
9.3. Construct cavity wall showing 3" thick cavity using butterfly wall ties providing cavity clean using cavity clean batten or board, dry bond only.

Project 10. Build a rat trap bond wall [3 Hours]

10.1. Prepare workshop floor area and set out the work area
10.2. Prepare/handle/spread mortar with trowel
10.3. Construct a rattrap bond wall making 9" thick (1 brick thick wall) up to 6 courses high showing internal trap clear, dry bond only.

References:

1. Chudley, R. and Greeno R., (2004), Building construction handbook, Oxford: Elsevier Butterworth-Heinemann
2. Purnima B.C., Jain A.K& Jain A.K,(2008), Building Construction, 11th Edition, Laxmi Publications.
3. Hash W.G., A.L.O.B. M.R.S.H, Brick work vol 1, Senior lecturer in building Collage of Technology Southampton, England, Hutchinson Technical Education Press.

Part II (Wood work)

Year: II **Total: 2 hours /week**
Part: I **Lecture: hours/week**
Tutorial: hour/week
Practical: 2 hours/week
Lab: hours/week

Course Description:

This module focuses on familiarization of carpentry work and its tools and equipment required.

Course Objectives:

After Completion of this course, students will be able to:

1. Identify the principles of carpentry works
2. Select and collect the hand tools required for conduction of carpentry works
3. Perform planning, shaving and joints making
4. Describe the theoretical knowledge on technology of wood and its conversion
5. Identify different types of wooden joints and their uses

Course Contents:

Practical: **[30 Hrs.]**

Project 1. Shave timber to the given dimension **[3 Hrs.]**

1.1. Apply hammer, chisel and hand planer to cut timber in required shape and size.

Project 2. Make cross half lap joint and its function **[3 Hrs.]**

2.1. Apply hammer, chisel and hand planer to cut timber in required shape and size
2.2. Construct and assemble cross half lap joint

Project 3. Make dovetail half lap joint and its function **[3 Hrs.]**

3.1. Apply hammer, chisel and hand planer to cut timber in required shape and size

3.2. Construct and assemble dovetail half lap joint

Project 4. Make mortise and tenon joint and its function [3 Hrs.]

4.1. Apply hammer, chisel and hand planer to cut timber in required shape and size
4.2. Construct and assemble dovetail half lap joint

Project 5. Make dovetail bridle joint and its function [3 Hrs.]

5.1. Apply hammer, chisel and hand planer to cut timber in required shape and size
5.2. Construct and assemble dovetail half lap joint

Project 6. Construct a small stool [10 Hrs.]

6.1. Identify uses of stool
6.2. Select materials for making stool
6.3. Select joints for constructing stool
6.4. Assemble different component of stool

Project 7. Apply finishing and varnish to the small stool [5 Hrs.]

7.1. Apply glazing procedure
7.2. Apply safety precaution

References:

1. SinghS., (n.d)., Engineering materials, Vikas publishing house pvt.ltd.
2. Silakar,D.L., (2054), An introduction of wood work.
3. Pudasaini,L. N., (2075), Wood and woodwork technology, Bhudipuran publication.
4. Byanjankar, M. M., (1996), The essential views in carpentry and masonry, Nepal Engineering College
5. Sthapit, C., Baidhya K. D., (latest edition). Sikarmibyabasaya.
6. Chudley, R. and Greeno R., (2004), Building construction handbook, Oxford: Elsevier Butterworth-Heinemann
7. Purnima B.C., Jain A.K& Jain A.K, (2008), Building Construction, 11th Edition, Laxmi Publications.

Second Year/Second Part

S.N.	Code	Subject
1	EG2201AR	Arts and Graphic II
2	EG2202AR	Building Materials II
1	EG2203AR	Computer Aided Drafting (CAD) II
2	EG2204AR	Surveying II
4	EG2205AR	Drafting II
5	EG2206AR	Architectural Model Making I
6	EG2207AR	Building Construction- I
8	EG2208AR	Building Design-I

Arts and Graphics II

EG2201AR

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

Part: II **Lecture: 1 hours/week**

Tutorial: hour/week

Practical: 6 hours/week

Lab: hours/week

Course Description:

This course intends to provide knowledge and skills on drawings presentation and design communicating techniques in the graphical manner. It mainly deals with presentation techniques, interior development, graphic techniques, colour technique and different medium presentation techniques. This course also intends to provide knowledge and skills of free hand drawing and composition with rendering using pencil color, Pen and Ink and Water Color.

Course Objectives:

After completion of this course students will be able to:

1. Explain freehand drawing and compositions.
2. Draw free hand drawing and composition using pencil color and Ink.
3. Draw different compositions with rendering using pencil color and Ink.
4. Draw furniture layout of building.
5. Explain the concept of coloring.
6. Arrangement of color scheme.
7. Present drawing in different mediums.

Course Contents:

Theory

Unit 1. Presentation techniques **[2 Hrs.]**

1.1. Introduction

1.2. Different medium

Unit 2. Interior development for presentation **[2 Hrs.]**

2.1. Introduction

2.2. Importance of the study

Unit 3. Graphic Techniques **[2 Hrs.]**

3.1. Introduction

3.2. Importance and its types

Unit 4. Color History and Techniques **[4 Hrs.]**

4.1. Introduction

4.2. Colour scheme and its types

Unit 5. Draw Presentation techniques in different medium **[5 Hrs.]**

5.1. Introduction

5.2. Different techniques and different medium (Pencil, Ink, Colour)
5.3. Rendering Techniques

Practical: **[90 Hrs.]**

Unit 1. Presentation techniques **[10 Hrs.]**

1.1. Sheet 1: Draw Free hand - Simple natural forms of tree, human figures **[2 Hrs.]**
1.2. Sheet 2: Draw Free hand- Simple manmade forms of box, bottle, table, chair, etc. **[2 Hrs.]**
1.3. Sheet 3: Draw using different types of textures and finishes **[2 Hrs.]**
1.4. Sheet 4: Draw different types of trees and shrubs **[2 Hrs.]**
1.5. Sheet 5: Draw and Compose Vehicles and its uses in various forms **[2 Hrs.]**

Unit 2. Interior development for presentation [**14 Hrs.]**

2.1. Sheet 6: Draw Furniture layout in building plan and section **[4 Hrs.]**
2.2. Sheet 7: Draw textures and its usage in interior **[4 Hrs.]**
2.3. Sheet 8: Draw Isometric view of furniture **[6 Hrs.]**

Unit 3. Graphic Techniques **[10 Hrs.]**

3.1. Sheet 9: Draw the Sheet no. 6 using ink graphics technique **[4 Hrs.]**
3.2. Sheet 10: Draw Section and elevation of Sheet 9 **[6 Hrs.]**

Unit 4. Color History and Techniques **[16 Hrs.]**

4.1. Sheet 11: Draw and compose Color types and color wheels **[4 Hrs.]**
4.2. Sheet 12: Compose different forms using Colour scheme and its types **[6 Hrs.]**
4.3. Sheet 14: Draw the forms using different colours tints and tones **[6 Hrs.]**

Unit 5. Draw Presentation techniques in different medium **[40 Hrs.]**

5.1. Sheet 15: Plan, elevations, Sections using ink technique **[8 Hrs.]**
5.2. Sheet 16: Plan, elevations, Sections using colour technique (Pencil colour) **[8 Hrs.]**
5.3. Sheet 17: Plan, elevations, Sections using colour technique *(Poster and water colour)* **[8 Hrs.]**
5.4. Sheet 18: Interior Perspective using different rendering technique *(Poster and water colour)* **[8 Hrs.]**
5.5. Sheet 19: Exterior Perspective using different rendering technique *(Poster and water colour)* **[8 Hrs.]**
5.6. Sheet 20: Prepare 2D/3D composition Collage/Mural or Magazine Cover **[8 Hrs.]**

References:

1. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.
2. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken:John Wiley & Sons.
3. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D.Van Nostrand, Company Inc.
4. Halse, A. O. (1972). Architectural rendering; the techniques of contemporary presentation. 2nd Ed. New York: McGraw-Hill.

Building Materials II
EG2202AR

Year: II **Total: 3 hours /week**
Part: II **Lecture: 3 hours/week**
Tutorial: hour/week
Practical: hours/week
Lab: hours/week

Course Description:
This course is designed to impart basic knowledge with physical and chemical properties on most of the commonly used building materials related to the construction. Diploma holders in Architectural assistantship are supposed to prepare working drawings of buildings. The basic knowledge of building materials and their behavior under varied climatic conditions is very essential from the point of building construction.

Course Objectives:
After the completion of this course, students will be able to:
1. Familiarize with the commonly used building materials,
2. Use application methods in building construction works, and
3. Analyze the physical and chemical characteristics and properties of various building materials.

Course Contents:

Theory

Unit 1. Introduction to Building material **[2 Hrs.]**
- 1.1. Introduction
- 1.2. Types of Building Material
  - 1.2.1. Natural material, aggregates.
  - 1.2.2. Manmade (Modern) Material; cement, reinforcement, concrete

Unit 2. Lime **[4 Hrs.]**
- 2.1. Introduction
- 2.2. Sources and manufacturing methods.
- 2.3. Chemical composition
- 2.4. Types of lime
- 2.5. Storage of lime
- 2.6. Preparation of Lime Paste
- 2.7. Setting action of fat lime and hydraulic lime

Unit 3. Cement **[10 Hrs.]**
- 3.1. Introduction of cement
- 3.2. Composition of cement (OPC, PCC, Extra Rapid Hardening)
- 3.3. Manufacturing methods
- 3.4. Properties and types
- 3.5. Storage of cement

3.6. Different types of tests
3.7. Placing, composition and curing of concrete

Unit 4. Mortars [6 Hrs.]

4.1. Meaning, Function and Types of mortar (mud, Surkhi, lime, cement)
4.2. Properties & uses of different types of mortar
4.3. Composition of ingredients in mortar (mud, lime-surkhi, cement & composite)
4.4. Proportion of mortar for different building works

Unit 5. Aggregates [2 Hrs.]

5.1. Introduction
5.2. Fine aggregates
5.3. Coarse aggregates

Unit 6. Cement concrete [12 Hrs.]

6.1. Definition and grading of concrete.
6.2. Workability of concrete
6.3. Water - Cement Ratio
6.4. Compaction of concrete
6.5. Curing of concrete
6.6. Mixing, placing and uses of cement concrete.
6.7. Concept of Reinforced cement concrete (RCC) and its grading
6.8. Necessity of providing reinforcement
6.9. Introduction to Ready-mix, self-compacting and light-weight concrete

Unit 7. Glass [3 Hrs.]

7.1. Types, sizes, usage,
7.2. Measurement systems
7.3. Market prices of commonly used glasses in building construction

Unit 8. Finishing [2 Hrs.]

8.1. Introduction
8.2. Material used in the floor finishing
8.3. Material used in the wall finishing
8.4. Material used in the ceiling finishing with specification.

Unit 9. Plastics [2 Hrs.]

9.1. Thermosetting and thermoplastics
9.2. Uses as materials in building, industry: flooring, roofing, wall paneling, pipes, doors.

Unit 10. Steel [2 Hrs.]

10.1. Definition,
10.2. Composition, properties
10.3. Types
10.4. Grades
10.5. Facts of Steel

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction to Building material	2	4
2	Lime	4	8
3	Cement	10	17
4	Mortars	6	10
5	Aggregates	2	4
6	Cement concrete	12	20
7	Glass	3	5
8	Finishing	2	4
9	Plastics	2	4
10	Steel	2	4
	Total	**45**	**80**

* There could be minor deviation in mark distribution.

References:

1. Bonapace, C., Sestini V. 2003. Traditional Materials and Construction Technologies used in the Kathmandu Valley. UNESCO, Peris.
2. Crawford, R. and Martin, P. 2020. Plastic Engineering, Fourth edition. ISBN: 9780081007099.
3. Duggal, S.K. 2019. Building Materials. New Age International Publishers, New Delhi.
4. Gan, M.S.J. 2020. *Cement* and *Concrete* (Special *Indian Edition*/ Reprint). ISBN-13: 978-0367411596
5. Hashmi, S. 2016. Comprehensive Materials Finishing. ISBN: 9780128032503.
6. Mandal, S.K. 2015. Steel Metallurgy: Properties, Specification and Application. McGraw-Hill Education (India) Private Limited.
7. Soderberg, G.A. Finishing Materials and Methods. McKnight & McKnight Publishing Company.
8. Zhang H. 2016. Building materials in Civil Engineering. Woodhead Publishing.

Computer Aided Drafting (CAD) II

EG2203AR

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

Part: II **Lecture: hours/week**

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This course intends to impart students with a broad introduction into 2D computer aided design and drafting with a focus on architectural drawings. This course deals as intensive introduction to the use of a CAD program for the development of working drawings.

Course Objectives

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

1. Create more accurate drawings in less time.
2. Use presentation that represents a design.

Course Contents:

Practical: **[60 Hrs.]**

Unit 1. Accomplish an Architectural drawing of residential building.

1.1. Practical 1-Draw a site plan, floor plans, elevations and sections of a single room using draw, modify, layer, dimensioning, and hatch commands. **[12 Hrs.]**

Unit 2. Draw an Architectural drawing of two storied residential building using draw, modify, layer, dimensioning, hatch and layout commands.

2.1. Practical 2- Draw a detail drawing of Floor plans **[12 Hrs.]**

2.2. Practical 3- Draw a Section and Elevations. **[12 Hrs.]**

2.3. Practical 4 -Draw Wall sections, doors and windows details. **[12 Hrs.]**

2.4. Practical 5- Draw Staircase details. **[12 Hrs.]**

References:

- Singh, V.P. (2019). *AutoCAD2019.* Computech Publications Ltd.
- Omura, G; Benton, B.C. (2015). *Mastering AutoCAD 2016 auto Autocad LT 2016.* Sybex

Surveying II
EG2204AR

Year: II **Total: 6 hours /week**
Part: II **Lecture: 2 hours/week**
Tutorial: hour/week
Practical: 4 hours/week
Lab: hours/week

Course Description:
This course focuses on familiarization of different surveying techniques and equipment. The different surveying techniques include area, volume, coordinate system, and graphical and analytical method of mapping.

Course Objectives:
After the completion of this course students will be able to:
1. Define and characterize the contour survey.
2. Explain the principles of plane tabling.
3. Apply modern survey techniques.
4. Use modern survey instruments for surveying, constructions and map making procedures.

Course Contents:

Theory

Unit 1. Contouring [6 Hrs.]
- 1.1. Definition – Contour, Contour interval, Horizontal equivalent, Index contour
- 1.2. Criteria for selection of contour interval
- 1.3. Characteristics of contours
- 1.4. Uses of contour maps
- 1.5. Methods of control for contour survey
  - 1.5.1. Direct method
  - 1.5.2. Indirect method
- 1.6. Methods of interpolation of contours

Unit 2. Plane Tabling [4 Hrs.]
- 2.1. Definition and principles
- 2.2. Accessories used in plane tabling
- 2.3. Working operations- Temporary adjustment and Orientation of plane tabling
- 2.4. Radiation and Intersection methods of plane tabling
  - 2.4.1. Intersection method
  - 2.4.2. Radiation methods
- 2.5. Merits and demerits of plane table surveying

Unit 3. Theodolite Traversing [10 Hrs.]
- 3.1. Introduction

3.2. Uses of theodolites
3.3. Technical terms, fundamental lines and planes of theodolite
3.4. Temporary adjustment of theodolite
3.5. Measurement of angles
  3.5.1. Horizontal angles
  3.5.2. Zenithal and Vertical angles
3.6. Tachometry (Theodolite traversing, detailing and plotting)

Unit 4. Area and Volume Measurement [4 Hrs.]

4.1. Basic definitions
4.2. Area by division into simple figures
4.3. Area by different methods
  4.3.1. Area by coordinates
  4.3.2. Area by trapezoidal rule
  4.3.3. Area by Simpson's 1/3 Rule
4.4. Volume by Trapezoidal formula
4.5. Volume by Prismoidal formula

Unit 5. Total Station Traversing [6 Hrs.]

5.1. Handling of Total station
5.2. General definition, EDM, Coordinate system
5.3. Traversing, Data collection and Plotting

Practical:

1. Perform Contouring on a sloped ground by indirect method (Grid method) **[10 Hrs.]**
2. Perform traversing by theodolite, Computation and Plotting of traverse. **[20 Hrs.]**
3. Perform traversing by total station, detailing and plotting of traverse. **[20 Hrs.]**
4. Conduct a building Layout by using Total Station. **[10 Hrs.]**

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Contouring	6	8
2	Plane Tabling	4	5
3	Theodolite Traversing	10	14
4	Area and Volume Measurement	4	5
5	Total Station Traversing	6	8
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Dr. BC Punmia, "Surveying"- Vol I & II, Laxmi Publication New Delhi
2. SK Duggal, "Surveying" Vol I &II,Tata MC Graw Hill Publishing

3. N Basnet & M Basnet, "Basic Surveying I", Benchmark Education Support Pvt, Ltd, Tinkune Katmmandu
4. N Basnet & M Basnet, " Basic Surveying II", Published by D. Shrestha & R. Shrestha, Rajmati Press, Lalitpur

Drafting II
EG2205AR

Year: II **Total: 7 hours /week**
Part: II **Lecture: 1 hours/week**
Tutorial: hour/week
Practical: 6 hours/week
Lab: hours/week

Course Description:
This course intends to provide knowledge and skills perspective theory and its technique; perspective drawings (media for expression of architectural design in 3 dimensional approaches) work of 1 point 2 points and 3 points vanishing perspective drawing (pictorial view) work.

Course Objectives:
After the completion of this course students will be able to:
1. Develop the concept of perspective
2. Develop a visual media for design presentation
3. Use application methods in building design and graphic works.

Course Contents:

Theory

Unit 1. Perspective Drawing as Pictorial View [2 Hrs.]
- 1.1. Definition/Terminology
- 1.2. Uses and importance
- 1.3. Basic principles

Unit 2. One-point Vanishing (Parallel) Perspective [2 Hrs.]
- 2.1. Definition/Terminology
- 2.2. Uses and importance
- 2.3. Basic principles

Unit 3. Two-point Vanishing (Angular) Perspective [2 Hrs.]
- 3.1. Definition/Terminology
- 3.2. Uses and importance
- 3.3. Basic principles
- 3.4. Comparison between 1 point & 2-point Vanishing Perspective Drawing.

Unit 4. Perspective Sketching and Sciagraphy [3 Hrs.]
- 4.1. Introduction to Sciagraphy
- 4.2. Uses and importance

Unit 5. Three-point Vanishing Perspective (oblique) view (introductory only) [3 Hrs.]
- 5.1. 5.1Definition/Terminology
- 5.2. 5.2Uses and importance
- 5.3. Basic principles

Unit 6. Interior Perspective [3 Hrs.]

6.1. Introduction to terms

Practical: **[90 Hrs.]**

Unit 1. Draw Perspective Drawing as Pictorial View of: **[6 Hrs.]**

1.1. Sheet 1:Line drawing of simple plane geometrical figure (Square) in perspective form with plan and elevation **[2 Hrs.]**

1.2. Sheet 2: Line drawing of simple plane geometrical figure (rectangle) in perspective form with plan and elevation **[2 Hrs.]**

1.3. Sheet 3: Line drawing of simple plane geometrical figure (circle) in perspective form with plan and elevation **[2 Hrs.]**

Unit 2. Draw One Point Perspective View Of: **[18 Hrs.]**

2.1. Sheet 4: Cube and Prism **[6 Hrs.]**

2.2. Sheet 5: Pyramid **[6 Hrs.]**

2.3. Sheet 6: Cylinder and Cone **[6 Hrs.]**

Unit 3. Draw Two Point Perspective View of: **[24 Hrs.]**

3.1. Sheet 7: Cube and Prism **[4 Hrs.]**

3.2. Sheet 8: Pyramid **[4 Hrs.]**

3.3. Sheet 9: Cylinder and Cone **[4 Hrs.]**

3.4. Sheet 10: Single Storey residential flat building [6 Hrs.]

3.5. Sheet 11: Single Storey residential Slope building **[6 Hrs.]**

Unit 4. Draw Perspective with Sciagraphy **[18 Hrs.]**

4.1. Sheet 12: Sciagraphy on simple geometric forms (Cube, cuboids, sphere) [**6 Hrs.]**

4.2. Sheet 13: One-point perspective interior perspective of a room with Sciagraphy. **[6 Hrs.]**

4.3. Sheet 14: Two-point perspective of an opening (door, arch, window, ventilation) with skiagraphy. **[6 Hrs.]**

Unit 5. Three Point Vanishing Perspective Drawing **[12 Hrs.]**

5.1. Sheet 15 and 16: Draw three-point perspective of simple geometric forms. (Cube, prism, cylinder, pyramid)

Unit 6. Interior Perspective View **[12 Hrs.]**

6.1. Sheet 17 and 18: Draw interior perspective view of the building

References:

1. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.
2. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken:John Wiley & Sons.
3. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D.Van Nostrand, Company Inc.
4. Halse, A. O. (1972). Architectural rendering; the techniques of contemporary presentation. 2nd Ed. New York: McGraw-Hill.
5. Holmes, J. M. (1954). Applied Perspective. London: Sir Isaac, Piotman and Sons Ltd.
6. Norling, E. (1969). Perspective drawing. California: Walter Fostor Art Books.

7. Robert, W. G. (2006). Perspective: From Basic to Creative. 1st Ed. London: Thames and Hudson.

Architectural Model Making – l

EG2206AR

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

Part: II **Lecture: hours/week**

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This course intends to equip students with knowledge and skills on making model of different geometrical objects and finishing of interior models with furniture of residence building.

Course Objectives:

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

1. Explain architectural models with knowledge of color combination in building at inside & outside surface.
2. Calculate the proportion of building & standard sizes of rooms with circulation area of different buildings.
3. Perform different shapes of modeling.
4. Make model as a visual media.

Course Contents:

Practical:

Unit 1. Apply/handle Hand tools and equipment [6 Hrs.]

1.1. Cut a Paper & make walls & furniture by using Anti-cutter.
1.2. Make a Model by using Metal ruler & Adhesive.
1.3. Make a base of model by using Thermocole.
1.4. Make a Wall & Furnitures by using Mount Board.
1.5. Apply adhesive material, their different using technics of joints.
1.6. Color by Painting brushes & Poster colors.
1.7. Develop a Color wheel.
1.8. Apply Tints & Tones.
1.9. Make a Color Scheme.

Unit 2. Develop Surface of the following surfaces [6 Hrs.]

2.1. Cube
2.2. Cylinder
2.3. Cone
2.4. Pyramid
2.5. Prism

Unit 3. Develop/Make Model of simple geometric solids [6 Hrs.]

3.1. Cube: Modeling of simple plain surface with 6 cm. sides
3.2. Cylinder: Modeling of simple plain surface of cylinder with 6cm. diameter base & 12 cm. axial height.
3.3. Cone: Modeling of simple plain surface of cone with 6cm. diameter base & 12cm. axial height.

3.4. Pyramid: Modeling of simple surface of pyramid of 6cm. square base & 12cm. axial height.
3.5. Prism: Modeling of simple surface of prism of 6cm. square top & bottom base & 12 cm. axial height

Unit 4. Make Model of simple geometric solids [12 Hrs.]

4.1. Composition of cubes in different sizes
4.2. Composition of cubes, prisms, pyramid, cone, & cylinder in different sizes to make Building block Model concept.

Unit 5. Make Model of building: [30 Hrs.]

5.1. Make a complete model of any floor plan with interior furniture lay-out of a single-story residential building or multi storied building including the following symbols:
   5.1.1. North Direction:
   5.1.2. Nameplate:
   5.1.3. scale:
   5.1.4. Plinth Area:
   5.1.5. Submission date:
   5.1.6. Checked by:

References:

1. Fuller Moore, Model builder's Note book, MC. Graw hall publishing company
2. Rolf Janke, Architectural Models, Architectural book publishing co.
3. Helper, Tenson, Interior design fundamentals.
4. Technical drawing- Frederick Giesecke.
5. Color drawing – Michael E. Doyle.
6. Rendering with pen & ink, The Thomes & Thomson Maunal.
7. Magazines – Inside Outside, A+D, Interior Design Society Interior, Fevicol co. Furnitures Magazine & design with dimensions.

Building Construction-I

EG2207AR

Year: II **Total: 5 hours /week**

Part: II **Lecture: 2 hours/week**

Tutorial: hour/week

Practical: 3 hours/week

Lab: hours/week

Course Description:

This course is designed to provide knowledge and skill in Building Construction techniques such as foundation, wall with DPC, floor with DPC and openings in wall. It intends to provide skills and knowledge on preparing drawings and sketches of building components.

Course Objectives:

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

1. Identify the different components of buildings.
2. Familiarize with the concept of building construction techniques.
3. Impart knowledge on importance of building construction in implementation of design outputs.

Course Contents:

Theory

Unit 1. Introduction to Building Construction [2 Hrs.]

1.1. Definition, rule within architectural context.
1.2. Construction materials, elements, tools & techniques.
1.3. Development and evolution of building technology.
1.4. Classifications of building, elements & structural system.

Unit 2. Site Works and Setting out [2 Hrs.]

2.1. Site investigation and site preparation.
2.2. Setting out the building.

Unit 3. Soil Investigation [2 Hrs.]

3.1. Types of soil, properties and bearing capacities.
3.2. Methods of improving bearing capacity of soil.
3.3. Soil explanation/investigation (test pit).

Unit 4. Timbering in Trenches [2 Hrs.]

4.1. Timbering in shallow foundation in hard soil to loose soil.
4.2. Timbering in shallow foundation in water logged soil.

Unit 5. Foundation (Substructure) [8 Hrs.]

5.1. Definition, purpose and function.
5.2. Shallow foundation and its types (strip, pad, combined, balanced, cantilever and raft foundation).
5.3. Deep foundation types as per distribution of load and materials for construction.
5.4. Foundation in sloping sites.

Unit 6. Dampness **[4 Hrs.]**

6.1. Definition, causes and ill effects.
6.2. Importance of damp prevention.
6.3. Damp proofing materials & their application in buildings.
6.4. Damp proofing methods & types.

Unit 7. Wall/ Masonry **[2 Hrs.]**

7.1. Solid load bearing wall (stone/brick/concrete block).
7.2. Construction Methods (bonding systems).
7.3. Features (Lintels, sills, jambs, their functions and construction techniques).

Unit 8. Floors **[6 Hrs.]**

8.1. Definition and functions.
8.2. Classifications (solid & suspended).
8.3. Materials for floor, elements, functions & construction.
8.4. Use of damp proof membrane and floor finishes.
8.5. Timber Floors (Single, double and triple).
8.6. Definition, Elements and construction details of upper floor.

Unit 9. Openings in Walls **[2 Hrs.]**

9.1. Lintel, Arches and their types.
9.2. Materials of Construction.

Practical:

Sheet 1: Draw the site lay out and Site Measurement **[5 Hrs.]**
(Setting out and checking methods, profile board, sloping sites, site plan with triangulation method)

Sheet 2: Draw Timbering for Trenches **[5 Hrs.]**
(Stay bracing, box sheeting, vertical sheeting, runner system, sheet piling)

Sheet 3: Draw Shallow Foundation I **[5 Hrs.]**
(Strip, pad or isolated, raft, stepped, steel grillage)

Sheet 4: Draw Shallow Foundation II **[5 Hrs.]**
(Combined foundation, cantilever bases, balanced base)

Sheet 5: Draw Deep Foundation **[5 Hrs.]**
(End bearing, friction, replacement, displacement, concrete, timber, steel pile)

Sheet 6: Draw Damp Proof Course **[4 Hrs.]**
(Treatment to foundation, basement, floors, wall, flat roof, parapet wall)

Sheet 7: Draw the Brick and Stone Masonry Wall **[4 Hrs.]**
(Ashlar and rubble walling, special brick, stretcher, English, Flemish and special bond)

Sheet 8: Draw Single Joist Timber Floor **[4 Hrs.]**
(Suspended and upper floor, bridging joist, strutting, bearing joints)

Sheet 9: Draw the Double and Triple Joist Timber Floor **[4 Hrs.]**
(Binder, girder, floor boarding joints)

Sheet 10: Draw the Arches **[4 Hrs.]**
(Camber, gauged segmental, semi-circular, centering of arches)

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction to Building Construction	2	3
2	Site Works and Setting out	2	3
3	Soil Investigation	2	3
4	Timbering in Trenches	2	3
5	Foundation (Substructure)	8	10
6	Dampness	4	4
7	Wall/ Masonry	2	3
8	Floors	6	8
9	Openings in Walls	2	3
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Kumar, S. (2014). *Building construction* (20th ed.). Standard Publishers and Distributors.
2. Punmia, Dr. B. C. (2008). *Building Construction*. Laxmi Publications.
3. Sharma S. K. and Kaul B. K. (2013). *A Text Book of Building Construction*. S.Chand Publishing.
4. Singh, G. (2009). *Building Planning & Design*. Standard Publications-Delhi.
5. Grundy, J. T. (1977). *Construction Technology*. Intl Ideas.
6. Grundy, J. T. (1977). *Building Construction* (Vol. 1). Edward Arnold.
7. Arora S.P and Bindra Dr. S.P. (n.d.), *The Text Book of Building construction*, Dhanpat Rai Publication.
8. Chudley, R. (Ed.). (1987). *Construction Technology* (Vol. 1-4). Longman Scientific & Technical.
9. King H and Nield D. (Ed.). (1967). *Building Techniques* (Vol. 1). Spon.
10. Mckay, J. K. (Ed.). (1969). *Building Construction* (2nd ed., Vol. 1). Longman.

Building Design-I
EG2208AR

Year: II **Total: 3 hours /week**
Part: II **Lecture: 1 hours/week**
Tutorial: hour/week
Practical: 2 hours/week
Lab: hours/week

Course Description:
This course intends to provide knowledge and skills on the design and development of a single-family residential building (minimum two bed rooms) within the land area of 0-8-0-0 (Anna) 2738.00 sq.ft in an urban/village or rural context.

Course Objective:
After completion of this course, students will be able to design single family building by themselves. After completion of this course students will be able to:

1. Select the site for the single-family residential building and conduct the site analysis of the site.
2. Inter-relate activities and spaces of the building.
3. Carry out the Program Formulation of need /requirement assessment of necessary spaces and their sizes.
4. Design the Furniture and fixture layout of various rooms
5. Follow proper planning and orientation techniques

Course Contents:

Theory

Unit 1. Site Selection **[4 Hrs.]**

1.1. Introduction
1.2. Criteria for the site selection
1.3. Importance of the climate for the building design.
1.4. Bye-laws and FAR
1.5. Microclimate of the area
  1.5.1. Sun
  1.5.2. Wind
  1.5.3. Temperature
  1.5.4. Humidity
  1.5.5. Precipitation
  1.5.6. Geology

Unit 2. Case Study **[2 Hrs.]**

2.1. Introduction
2.2. Importance and need of case study for the building design

Unit 3. Program Formulation **[2 Hrs.]**

3.1. Introduction
3.2. Process of Program Formulation

Unit 4. Concept Design [4 Hrs.]
4.1. Introduction
4.2. Steps of Concept Design
4.3. Importance of Concept and philosophy in design.

Unit 5. Design Development [2 Hrs.]
5.1. Introduction
5.2. Process for the Design Development

Unit 6. Plan, Elevation, section and 3D views and cross sections. [1 Hrs.]
6.1. Introduction
6.2. Development of Design

Practical: [30 Hrs.]

Unit 1. Site Selection and Analysis [4 Hrs.]
1.1. Decide and select the site for the residence design
1.2. Analyze the Site Considering the Site Condition and Climatic condition. Do SWOT analysis of the site.

Unit 2. Case Study and Literature Review [4 Hrs.]
2.1. Collect and review the books, manuals and other publications on residential design
2.2. Select the case study sites
2.3. Visit the sites for the case study

Unit 3. Program Formulation [2 Hrs.]
3.1. Formulate the Program –Spatial requirements.

Unit 4. Concept Design [4 Hrs.]
4.1. Prepare the bubble diagram to show the functional relationship between activities; inter-relationship of spaces
4.2. Develop the zoning in the site plan
4.3. Prepare the Conceptual Design & circulation and movements of people (based on anthropometry analysis).
4.4. Preparation of room plans, corridor and hallway

Unit 5. Design Development [5 Hrs.]
5.1. Prepare the Floor Plan considering proper living spaces and service, circulation and linking spaces like corridor and staircase.
5.2. Incorporate the Cultural, Social, Environmental and Traditional Values - Evolution of form in elevation.

5.3. Revise the floor plan and design of functional & efficient spaces, Technology – Availability of materials and appropriateness of construction method structure type, massive or skeletal system.

5.4. Develop all necessary plans, 4 elevations and 2 sections

Unit 6. Cross sections, profile and 3D view development [5 Hrs.]

6.1. Draw a profile section of the site.

6.2. Develop 3D views/Perspective of the design

Unit 7. Final Design Development and Presentation [6 Hrs.]

7.1. Prepare the Site Plan with septic tank, soak pit and boundary wall.

7.2. Prepare the Final Design & Drawings including Ground Floor Plan (all typical Plans) with, 4 Elevations & 2 Sections. Profile section of the site, 3D views or Perspective view of the project and *conduct presentation of the final design.*

Note: Unit 7 Filed Visit: Conduct a one-day visit nearby Residential Building and observe Space Layout, Furniture layout, light and ventilation, landscape features, infrastructure etc. Take inferences from the case study and implement in the design development. Prepare a report and make a presentation.

References:

1. Virginia M., (2012), Detail in contemporary Residential Architecture: Laurence King Publishing.
2. Francis D.K., Ching, (2011), A Virtual Dictionary of Architecture: Wiley
3. Molan, M., (2009), The Architects Guide to Residential Design: McGraw-Hill
4. Singh, Gurcharan &Singh Jagadish, Building Planning Designing and Scheduling.
5. 8.13. Joseph D.C., - Time-Saver Standards for Building Types, McGraw-Hill Donald
6. Government of Nepal, Building Bye-Laws of Kathmandu, 2064 BS.

Third Year/First Part

S.N.	Code No.	Subjects
1	EG3101AR	Construction Management
2	EG3102AR	Architectural Model Making II
3	EG3103AR	Building services, I
4	EG3104AR	Steel and Timber Structures
5	EG3105AR	Building Construction II
6	EG3106AR	Building Design II
7	EG3107AR	Working Drawing I

Construction Management

EG3101AR

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

Part: I **Lecture: 4 hours/week**

Tutorial: hour/week

Practical: hours/week

Lab: hours/week

Course Description:

This course focuses on management of construction works. This course imparts knowledge on accounts, procurement of works, contract management, planning, scheduling, and managing construction works.

Course Objectives:

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

1. Acquire basic knowledge on management of construction works.
2. Plan and schedule different activities of construction project.
3. Plan and schedule resources required in construction project.
4. Describe the basics of procurement/contract management.

Course Contents:

Theory

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

1.1. Definition of Project
1.2. Definition of Management
1.3. Need of Construction Management
1.4. Functions of Construction Management

Unit 2. Project Planning and Scheduling **[12 Hrs.]**

2.1. Definition of Planning
2.2. Steps in Planning
2.3. Importance of Planning
2.4. Construction Site Planning
2.5. Work Breakdown Structure
2.6. Bar Chart
2.7. Linked Bar Chart and Milestone Chart
2.8. Advantages of Construction Schedule
2.9. Preparation of Construction Schedule
2.10. Material Schedule
2.11. Labor Schedule
2.12. Equipment Schedule
2.13. Financial Schedule
2.14. S-Curve

Unit 3. CPM and PERT [14 Hrs.]

3.1. Introduction to planned approaches in construction management
3.2. Elements of Network
3.3. Network Rules
3.4. Definition of the Terms: Network Diagram, Activity, Event, Forward Pass, Backward Pass, Critical Path
3.5. Determination of Critical Paths and Floats
3.6. Introduction to PERT

Unit 4. Contract Administration and Accounts [12 Hrs.]

4.1. Definition of Contract
4.2. Essential elements of a Valid Contract
4.3. Types of Construction Contracts
4.4. Information to be given in Tender Notice
4.5. Tender Document
4.6. Bid Bond and Performance Bond
4.7. Contract Document
4.8. Conditions of Contract
4.9. Supervising Work of a contractor
4.10. Duties and Responsibilities of a Site Supervisor
4.11. Site Order Book
4.12. Materials at Site Account
4.13. Muster Roll
4.14. Measurement Book
4.15. Running Bill and Final Bill
4.16. Completion Report
4.17. Assets and Liabilities
4.18. Relation between Owner, Consultant, and Contractor
4.19. Disputes

Unit 5. Quality [3 Hrs.]

5.1. Definition of Quality
5.2. Characteristics of Quality
5.3. Factors affecting Quality
5.4. Stages of Quality Control

Unit 6. Monitoring, and Control [5 Hrs.]

6.1. Introduction to Monitoring
6.2. Purpose of Monitoring
6.3. Introduction to Control
6.4. Elements of Control: Quality, Cost, and Time
6.4.1. Quality Control

6.4.2. Cost Control
6.4.3. Time/Schedule Control

Unit 7. Construction Equipment [6 Hrs.]

7.1. Advantages of using Construction Equipment
7.2. Equipment for Excavation
7.3. Equipment for Concrete Mixing
7.4. Equipment for Transportation and Compaction
7.5. Equipment for Lifting of Materials and Parts

Unit 8. Safety [4 Hrs.]

8.1. Introduction to Accidents
8.2. Causes of Accidents
8.3. Importance of Safety
8.4. Safety Measures

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	4	5
2	Project Planning and Scheduling	12	16
3	CPM and PERT	14	19
4	Contract Administration and Accounts	12	16
5	Quality	3	4
6	Monitoring, and Control	5	7
7	Construction Equipment	6	8
8	Safety	4	5
	Total	**60**	**80**

* There could be minor deviation in mark distribution.

References:

1. Adhikari, R. P., Construction Management, Akshlok Prakasan, Kathmandu
2. Project Planning and Control with Pert and Cpm [Dec 31, 2001] Punmia, Dr. B. C. and Khandelwal, K.
3. Shrestha, S.K.; Adhikari, I. A text book of Project Engineering, Chandeswori Publication, Latest version.
4. Dutta, B. N., Estimating and Costing, Amazon link https://amzn.to/2NYNZbR.

Architectural Model Making – II

EG3102AR

Year: III **Total: 6 hours /week**
Part: I **Lecture: 1 hours/week**
Tutorial: hour/week
Practical: 5 hours/week
Lab: hours/week

Course Description

This course is designed to provide knowledge & skills on making model of different types of simple & complex building. It deals with model of complex building including or excluding topographical (Contour type land) model of site with landscaping.

Course Objectives:

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

1. Describe the concept of exterior building with landscaping model.
2. Make models of simple & complex building with topographical (contour) site.
3. Make building's simple & complex models as visual media / self-designed building plan /detailed drawings.

Course Contents:

Theory

Unit 1. Model Making **[7 Hrs.]**

1.1. Introduction
1.2. Types of buildings
1.3. Tools and techniques
1.4. Materials used for Model making

Unit 2. Land Scaping **[8 Hrs.]**

2.1. Introduction
2.2. Orientation (North Direction)
2.3. Scale
2.4. Site Area
2.5. Plinth Area
2.6. Contour
2.7. Vegetation

Practical:

Unit 1. Model **[55 Hrs.]**

1.1. Make a Model for Residence building/ commercial building/ school building/ college building with landscape.
1.2. Interpret the previous model making of different categories buildings.
1.3. Calculate in metric & imperial units of regular & irregular site (land).
1.4. Make a model of single or multistoried building:
  1.4.1. Residence building,
  1.4.2. Commercial building,

1.4.3. School building,
1.4.4. College building.

Unit 2. Model of landscaping [20 Hrs.]

2.1. Make Model of landscaping with or without contour site including the following symbols/sign/information:
2.1.1. Make Orientation (North Direction)
2.1.2. Design a Nameplate,
2.1.3. Make a scale
2.1.4. Calculate Site Area
2.1.5. Develop Plinth Area

References:

1. Fuller Moore, Model builder's Note book, MC. Graw hall publishing company.
2. Rolf Janke, Architectural Models, Architectural book publishing co.
3. Technical drawing- Frederick E. Giesecke, latest edition.
4. Color drawing – Michael E. Doyle, latest edition.

Building Services-I

EG3103AR

Year: III **Total: 6 hours /week**

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

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This module focuses on building services such as Water Supply System, House Drainage System and plumbing works related to civil constructions. The range of information required and the graphical techniques used to convey such information; a very good understanding of the way building services are used in construction and the understanding of its details. Assignment in this module enhances practical knowledge about these building services, their types and installations methods.

Course Objectives:

After Completion of this course, students will be able to:

1. Describe various systems of building services.
2. Develop an appropriate detail drawing of these building services.
3. Apply operating systems of plumbing works;
4. Identify the tools and equipment required to plumbing works;
5. Perform simple pipe fittings works

Course Contents:

Theory

Unit 1. Water supply system **[12 Hrs.]**

- 1.1. Introduction
- 1.2. Objective of water supply
- 1.3. Water supply and public health
- 1.4. Water sources
- 1.5. Water cycle
- 1.6. Type of source
  - 1.6.1. Rain Water
  - 1.6.2. Ground water sources
  - 1.6.3. Natural Surface Water
- 1.7. Services connection
- 1.8. Appurtenances
- 1.9. Rain water harvesting.
- 1.10. Water Treatment and Purification
- 1.11. Requirements of Good Distribution System
- 1.12. Layouts of Distribution Network
- 1.13. Methods of water Distribution
  - 1.13.1.Gravity System
  - 1.13.2. Pumping System
  - 1.13.3. Combined Gravity and Pumping System
- 1.14. Water requirement standards for various types of building

1.14.1. Domestic demand
1.14.2. Livestock demand
1.14.3. Commercial demand
1.14.4. Public/municipal demand
1.14.5. Industrial demand
1.14.6. Firefighting demand
1.14.7. Loss and wastage
1.14.8. Total water demand

1.15. Types of Pipes used for water Supply and drainage system
1.15.1. Cast Iron Pipes
1.15.2. Steel Pipes
1.15.3. Galvanized Iron Pipes
1.15.4. Copper Pipes
1.15.5. PVC Pipes
1.15.6. Concrete Pipes
1.15.7. Polypropylene (PPR) Pipes

1.16. Valves and Fittings:
1.16.1. Valves- Purpose, Types-sluice, reflux, air and drain valves, Meter, Globe, Ball, Safety, Gate.
1.16.2. Fittings-Purpose, Types-stop cocks, water taps, bends, reducers, tees, socket, elbow, union, cross, wash basin, shower, sink
1.16.3. Operation and Maintenance-Necessity, Methods-regular and emergency.

1.17. Storage and distribution of water supply in the building Storage tank
1.17.1. Distribution of cold water and hot water in plumbing system
1.17.2. Localized water heating system.

Unit 2. House Drainage System [10 Hrs.]

2.1. Introduction
2.2. Definition of terms in Drainage System
2.3. Principles of house Drainage
2.4. Components of House drainage system
2.5. Traps
2.5.1. Requirements of good trap
2.5.2. Classification of Traps
2.6. Pipes and its size used for drainage system
2.7. Sanitary Fittings
2.7.1. Wash basin
2.7.2. Sinks
2.7.3. Bath tubs
2.7.4. Water Closets
2.7.5. Urinals
2.7.6. Flushing Cisterns
2.8. System of Plumbing for House Drainage
2.8.1. Single Stack System
2.8.2. One pipe system
2.8.3. Single stack partially ventilated system

2.8.4. Two pipe system

2.9. Sewage disposal from apartments and housing

2.9.1. Septic tank, soak pit design and construction

Unit 3. Plumbing System [8 Hrs.]

3.1. Introduction of Plumbing & Plumber's Hand Tool

3.1.1. History of plumbing.

3.1.2. Importance of plumbing

3.1.3. Plumbing and sanitary

3.1.4. Scope of plumbing

3.2. Plumber's Hand Tools:

3.2.1. Pipe wrench of size 9", 12", and up to 18" long.

3.2.2. Pair of footprints.

3.2.3. Stocks and dies, up to 2" diameter, replacement of cutters

3.2.4. Wrench chain

3.2.5. Hack's saw frame and blade

3.2.6. Measuring tape

3.2.7. Soldering iron

3.2.8. Tin snips

3.2.9. Rasp

3.2.10. Caulking iron

3.2.11. Adjustable wrench up to 12 long.

3.2.12. Claw hammers /Ball pin hammer/Claw hammer

3.2.13. Pipe cutter-use and care adjustment of cutting wheels.

3.2.14. Drilling machine and its bits.

3.2.15. Pipe vise

3.2.16. Bench vice

3.2.17. Spanners of various size

3.2.18. Folding rules metallic/steel

3.2.19. Try square, Vernier caliper joining elements: Nuts, bolts, washer, pins, screws and rivets and jute/pipe tape and lead.

3.3. Pipe Threading to Dimension: Measuring pipe to millimeter

3.3.1. Measuring methods

3.3.2. Die holding/threading methods

3.3.3. Die checking/cleaning/oiling

3.3.4. Die tightening and loosing/fixing cutter

3.3.5. Checking accurate threading and its sharpness

3.3.6. Doing loosen the die fixing the pipe to die and repeat the threading twice for sharpness. (Repeat)

3.4. Assembling the Threaded Pipe to Fittings with Pipe Tape as per Drawing:

3.4.1. Visualization of drawing in detail

3.4.2. Collecting the fittings

3.4.3. Collecting the threaded pipes in position

3.4.4. Fixing the fittings with pipe tape to pipe in position

3.4.5. checking the tightness/testing pipe joints

3.4.6. Adjusting measurement

3.4.7. Marking, laying, using chalk line to wall/floor/ceiling
3.4.8. Accurate pipe cutting with margin of necessary threads to pipe
3.4.9. Fixing pipe to pipe vice
3.4.10. Positioning techniques.

Practical: **[60 Hrs.]**

Unit 1. Water supply system on Single Storey Residential Building **[21 Hrs.]**

1.1. **Report** **[3 Hrs.]**

1.1.1. Conduct market study, collect data, prepare report and conduct presentation on water supply fitting and fixtures available in Nepal.

1.2. **Portfolio Submission** **[18 Hrs.]**

1.2.1. Sheet No. 1: Draw typical figure of valves used in water supply system and drainage system. (With dimension, scale of drawing) **[2 Hrs.]**
1.2.1.1. Indicate Direction of Flow
1.2.1.2. Use proper symbols of the services.

1.2.2. Sheet No. 2: Draw typical plan, section & isometric view of restroom to show Water supply layout (with dimension, scale of drawing): [**3 Hrs.]**
1.2.2.1. Indicate the location of the water tap, fitting e.g. shower, basin etc.
1.2.2.2. Illustrate the vertical and horizontal piping connection with specification of the piping
1.2.2.3. Indicate Direction of Flow.
1.2.2.4. Use proper symbols of the services.

1.2.3. Sheet No. 3: Draw typical plan, section & isometric view of kitchen to show water supply layout (with dimension, scale of drawing) **[3 Hrs.]**
1.2.3.1. Indicate the location of the wash basin, sink)
1.2.3.2. Illustrate the vertical and horizontal piping connection with specification of the piping
1.2.3.3. Indicate Direction of Flow
1.2.3.4. Use proper symbols of the services.

1.2.4. Sheet No.4: Draw plan of site plan to show Water supply layout (with dimension, scale of drawing): **[2 Hrs.]**
1.2.4.1. Indicate the location of the water meter, water tank, water tap, fitting.
1.2.4.2. Illustrate the vertical and horizontal piping connection with specification of the piping
1.2.4.3. Indicate Direction of Flow.
1.2.4.4. Use proper symbols of the services.

1.2.5. Sheet No. 5: Draw plan and section of ground floor to show Water supply layout (with room names, dimension, scale of drawing): **[3 Hrs.]**
1.2.5.1. Indicate the location of the water meter, water tank, water tap, fitting e.g. Kitchen tap, shower, basin etc.
1.2.5.2. Illustrate the vertical and horizontal piping connection with specification of the piping
1.2.5.3. Indicate Direction of Flow.
1.2.5.4. Use proper symbols of the services.

1.2.6. Sheet No. 6: Draw plan and section of Terrace to show Water supply layout (with dimension, scale of drawing): **[3 Hrs.]**

1.2.6.1. Indicate location of the water tank, water tap, , hot water supply fitting and rain water pipe layout
1.2.6.2. Illustrate the vertical and horizontal piping connection with specification of the piping
1.2.6.3. Indicate Direction of Flow
1.2.6.4. Use proper symbols of the services.
1.2.7. Sheet No. 7: Draw plan and section of underground water tank (with dimension, scale of drawing **[2 Hrs.]**
1.2.7.1. Indicate Direction of Flow
1.2.7.2. Use proper symbols of the services

Unit 2. House Drainage System [15 Hrs.]

2.1. **Report Submission [3 Hrs.]**

2.1.1. Conduct market study, collect data and prepare report and presentation on Drainage fitting and fixtures available in Nepal.

2.2. **Portfolio Submission [12 Hrs.]**

2.2.1. Sheet No. 8: Draw typical plan and section of restroom to show Drainage layout (with dimension, scale of drawing) **[3 Hrs.]**
2.2.1.1. Indicate the location of the water closet, floor trap)
2.2.1.2. Illustrate the vertical and horizontal piping connection with specification of the piping
2.2.1.3. Indicate Direction of Flow
2.2.1.4. Use proper symbols of the services.
2.2.2. Sheet No. 9: Draw site plan to show Drainage layout (with dimension, scale of drawing **[3 Hrs.]**
2.2.2.1. Indicate the location of the sewer manhole, waste discharge outlet e.g. septic tank, soak pit, gully trap and intercepting trap, manhole etc.
2.2.2.2. Illustrate the vertical and horizontal piping connection with specification of the piping
2.2.2.3. Indicate Direction of Flow
2.2.2.4. Proper symbols of the services.
2.2.3. Sheet No. 10: Draw plan and section of ground floor to show Drainage layout (with room names, dimension, scale of drawing) **[3 Hrs.]**
2.2.3.1. Indicate the location of the sewer manhole, waste discharge outlet e.g. floor trap and from fittings e.g. Kitchen tap, w.c., basin, etc.
2.2.3.2. Illustrate the vertical and horizontal piping connection with specification of the piping
2.2.3.3. Indicate Direction of Flow
2.2.3.4. Proper symbols of the services.
2.2.4. Sheet No. 11: Draw plan and section of septic tank and soak pit, traps and manhole. (With dimension, scale of drawing) **[3 Hrs.]**
2.2.4.1. Indicate Direction of Flow
2.2.4.2. Use proper symbols of the services.

Unit 3. Plumbing Practical Workshop [24 Hrs.]

3.1. Practical 1: Make L, cross and T bends project of PVC pipe [**3 Hrs.]**

3.2. Practical 2: Join PVC fittings with PVC pipe. **[3 Hrs.]**
3.3. Practical 3: Install PPR pipe with fittings. **[3 Hrs.]**
3.4. Practical 4: Install CPVC pipe with fittings. **[3 Hrs.]**
3.5. Practical 5: Perform internal (below ground level) pipe layout and assembling fittings using pipe tape for water supply or sanitation works. **[6 Hrs.]**
3.6. Practical 6: Perform external (wall) pipe layout and joining fittings for water supply. **[6 Hrs.]**

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Water supply system	12	16
2	House Drainage System	10	13
3	Plumbing System	8	11
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References

1. Chudley, R. and Greeno R. (2004), Building construction handbook, Oxford: Elsevier Butterworth-Heinemann.
2. Purnima B.C., Jain A.K& Jain A.K, (2008),Building Construction, 11th Edition, Laxmi Publications
3. Hammer, M.J. (1996), Water and Wastewater Technology, Englewood Cliffs, N.J., Prentice Hall, International, Inc., Australia.
4. Barnes, D. (1981), Water and Wastewater Engineering Systems (Volumes 1 and 2), Marshfield, Mass., Pitman
5. Schroeder, (1977), E.R. Water and Wastewater Treatment (Volumes 1 and 2), New York, McGraw-Hill
6. Cassels, D. (1974), Services for Housing, Sanitary Plumbing, and Drainage, London, H.M.S.O.
7. Babbit, H.E. (1960), Plumbing, New York, McGraw-Hill.

Steel and Timber Structures

EG3104AR

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

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

Tutorial: hour/week

Practical: 2/2 hours/week

Lab: hours/week

Course Description:

This course provides the general ideas and design of steel and timber structural members using relevant codes of practice. After completion of this course, students must be able to supervise steel fabrication and construction and s/he should be able to design simple steel and timber members and joints.

Course Objectives:

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

1. Identify proper selection and calculate the design parameters for the materials.
2. Design structural elements of steel beams, columns and joints.
3. Design structural elements of timber beams, columns and joints.
4. Understand concept of design and code provisions
5. Prepare the proper detailing of structural members (steel & timber) and their connections.

Course Contents:

Theory

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

1.1. Types of rolled steel sections used in steel structures
1.2. Grades of steel and characteristics strength
1.3. Advantages and disadvantages of steel structures
1.4. Use of steel table and relevant NBC, (IS: 800-1984.Code of Practice for General Construction in Steel) & IS: 800 codes
1.5. Types of loads on steel structure and its code specification
1.6. Codes of practice for design of steel structures
1.7. Methods of analysis and design

Unit 2. Design Methods **[4 Hrs.]**

2.1. Basic assumptions in working stress design
2.2. Service load and permissible stresses
2.3. Design in tension, compression and bending
2.4. Different limit states for steel design
2.5. Design strength of materials and design loads
2.6. Limit state of strength and serviceability

Unit 3. Joints in the Steel Structures **[5 Hrs.]**

3.1. Types of joints: Riveted, bolted and welded joints
3.2. Modes of failure of riveted and bolted joints
3.3. Rivet value and efficiency of joints
3.4. Design of simple riveted and bolted joints under axial loads
3.5. Design of simple welded connections under axial loads

Unit 4. Design of Tension Members [8 Hrs.]

4.1. Introductions
4.2. Types of tension members
4.3. Net sectional area
4.4. Design of axially loaded tension members

Unit 5. Design of Compression Members [8 Hrs.]

5.1. Types of compression members
5.2. End condition and Effective lengths
5.3. Radius of gyration and slenderness ratio
5.4. Strength of compression members
5.5. Design of axially loaded compressive members

Unit 6. Design of Roof Trusses [4 Hrs.]

6.1. Types of roof trusses and their components
6.2. Different types of loads on roof truss
6.3. Introduction to the design of roof trusses
6.4. Tubular sections

Unit 7. Timber Structures [4 Hrs.]

7.1. Introduction of timber
7.2. Properties of timber
7.3. Use of timber as a structural member in construction
7.4. Code of practice (IS: 883) for design of timber structures
7.5. Advantage & disadvantage of timber structure

Unit 8. Design of Timber Structure [8 Hrs.]

8.1. Design of compression members
8.2. Design of solid rectangular beam
8.3. Check for deflections
8.4. Types of joints and their connection

**** Note: IS: 800, IS: 883 and steel table are allowed in the examination***

Practical: [15 Hrs.]

1. Draw bolted and riveted joints.

2. Draw welded joints.
3. Draw steel beam-column connection and column bases.
4. Draw roof truss joint details with riveted, bolted and welded connections.
5. Draw timber roof truss joint details using steel plates with bolted connections.
6. Draw Common joints in different timber members of heritage structures.
7. Draw timber beam and column joint details.

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	4	7
2	Design Methods	4	7
3	Joints in the Steel Structures	5	10
4	Design of Tension Members	8	14
5	Design of Compression Members	8	14
6	Design of Roof Trusses	4	7
7	Timber Structures	4	7
8	Design of Timber Structure	8	14
	Total	**45**	**80**

* There could be minor deviation in mark distribution.

References:

1. (n.d.). *IS 883:1994. DESIGN OF STRUCTURAL TIMBER IN BUILDING.* New Delhi: BUREAU OF INDIAN STANDARDS.
2. (n.d.). *IS: 800-1984.Code of Practice for General Construction in Steel.* New Delhi: BUREAU OF INDIAN STANDARDS.
3. (n.d.). *NBC 111 : 1994* . Department of Urban Development and Building Construction .
4. (n.d.). *NBC 112 : 1994.* Department of Urban Development and Building Construction.
5. NEGI, L. S. (1997). *Design of Steel Structures* (Second ed.). New Delhi: Tata McGraw-Hill.

Building Construction II

EG3105AR

Year: III **Total: 6 hours /week**

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

Tutorial: hour/week

Practical: 4 hours/week

Lab: hours/week

Course Description:

This course intends to provide knowledge and skills building construction work such as frame structure, timber roof, staircase and doors and windows of timber. It also focuses on preparation of building drawings.

Course Objectives:

After the completion of this students will be able to:

1. Familiarize with techniques for construction of building and their components.
2. Identify the various details for an application in construction works.
3. Draw complete building drawing sets

Course Contents:

Theory

Unit 1. Simple Frame Buildings **[4 Hrs.]**

1.1. Introduction to Framed structure and parts of building

1.2. RCC components, columns, beams, slabs

Unit 2. Special Walls **[4 Hrs.]**

2.1. Definition & types

2.2. Cavity wall

2.3. Partition wall

2.4. Curtain wall

2.5. Elements, construction detail of cavity, partition and curtain wall

Unit 3. Timber door, window and ventilator **[6 Hrs.]**

3.1. Definition, elements and types

3.2. Construction Method and joinery details

Unit 4. Staircase **[8 Hrs.]**

4.1. Timber stairs

- 4.1.1. Definition materials and layout
- 4.1.2. Proportioning and design principles
- 4.1.3. Construction method and joinery details
- 4.1.4. Types: Straight and quarter turning

4.2. Concrete stairs

- 4.2.1. Precast and cast in situ concrete stairs
- 4.2.2. Types and construction

4.3. Metal and Steel stairs

- 4.3.1. Ladder and Spiral

4.3.2. Function, construction and detailing

Unit 5. Roofs [8 Hrs.]

5.1. Timber Roof
- 5.1.1. Definition, elements and functions
- 5.1.2. Construction methods and joinery details
- 5.1.3. Single Roof
  - 5.1.3.1. Lean to Roof and double lean-to roof
- 5.1.4. Double Roof
  - 5.1.4.1. Collar and couple roof
  - 5.1.4.2. Scissor and close couple roof
- 5.1.5. Triple or Framed Roof
  - 5.1.5.1. King post roof.
  - 5.1.5.2. Queen post roof
- 5.1.6. Timber Roof Trusses

5.2. Steel roof truss
- 5.2.1. Definition, elements and functions
- 5.2.2. Construction methods and joinery details
- 5.2.3. Tubular roof truss
- 5.2.4. Angle roof truss

5.3. Skylight (roof light)

Practical: [60 Hrs.]

Sheet 1: Draw Simple Framed Structures [6 Hrs.]
(RC column and beam binding arrangement, one way and two-way slab)

Sheet 2: Draw Cavity and Partition wall [6 Hrs.]
(Cavity at foundation, opening and parapet, wall ties, brick and timber partition wall)

Sheet 3: Draw Timber Doors [6 Hrs.]
(Battened and ledge, ledge and brace, panelled, flush, solid core, mouldings)

Sheet 4: Draw Timber Window and Ventilator [6 Hrs.]
(Casement, jamb, mullion, sash, ventilator)

Sheet 5: Draw Timber Staircase [6 Hrs.]
(Plan, section, construction details, support and fixing details)

Sheet 6: Draw Concrete Staircase [6 Hrs.]
(Straight flight, half space landing, string beam, continuous, cantilever, open spiral, precast)

Sheet 7: Draw Steel Staircase [6 Hrs.]
(Fire escape, spiral, string beam)

Sheet 8: Draw Single and Double Timber Roof [6 Hrs.]
(Lean to roof, couple, closed couple, collar, ridge and eaves detail, dovetail halved joint)

Sheet 9: Draw Triple Timber Roof [6 Hrs.]
(King post, queen post, mansard, joint details)

Sheet 10: Draw Steel Roof Truss [6 Hrs.]
(Tubular roof truss, angle roof truss, joint details)

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	**Simple Frame Buildings**	4	5
2	**Special Walls**	4	5
3	**Timber door, window and ventilator**	6	8
4	**Staircase**	8	11
5	**Roofs**	8	11
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Kumar, S. (2014). *Building construction* (20th ed.). Standard Publishers and Distributors.
2. Punmia, Dr. B. C. (2008). *Building Construction*. Laxmi Publications.
3. Punmia, Dr. B. C. (2012). Reinforced Concrete Structure (Vols. 1–2). Laxmi Publications.
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8. Mckay, J. K. (Ed.). (1969). *Building Construction* (2nd ed., Vol. 1). Longman.
9. Mckay, W. B. (Ed.). (1970). *Building Construction* (5th ed., Vol. 1).
10. Arthanari S. and A. G. Augustine, (2002). *Building Technology & Valuation* (1st ed.). Mcgraw Hill Education.

Building Design II
EG3106AR

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

Course Description:
This course intends to deal to enhance the knowledge and the skills on the designing commercial building/ school building (in a small size) in an urban or in the rural context.

Course Objective:
After completion of this course, students will be able to design a school/ commercial building by themselves. After completion of this course students will be able to:

1. Select the site for the school / commercial building and conduct the site analysis of the site.
2. Inter-relate activities and spaces of the building.
3. Carry out the Program Formulation of need /requirement assessment of necessary spaces and their sizes.
4. Design the Furniture and fixture layout of various rooms.
5. Follow proper planning and orientation techniques.

Course Contents

Theory

Unit 1. Site Selection for the design of a School Building [4 Hrs.]

1.1. Introduction
1.2. Criteria for the site selection
1.3. Importance of climate for the building design.
1.4. Micro-climate of the area
  1.4.1. Sun
  1.4.2. Wind
  1.4.3. Temperature
  1.4.4. Humidity
  1.4.5. Precipitation
  1.4.6. Geology
  1.4.7. Openings – doors & windows for light, cross ventilation & thermal comfort.
1.5. Bye-laws-FAR, Light Plane, Set Back etc.

Unit 2. Case Study of Various National and International Schools [4 Hrs.]

2.1. Introduction
2.2. Importance and need of case study for the school building design

Unit 3. Program Formulation [2 Hrs.]

3.1. Introduction
3.2. Process of Program Formulation

Unit 4. Concept Design [2 Hrs.]
4.1. Introduction
4.2. Steps of Concept Design
4.3. Importance of Concept and philosophy in design.

Unit 5. Design Development [2 Hrs.]
5.1. Introduction
5.2. Process for the Design Development

Unit 6. Plan, Elevation, section and 3D views and cross sections [1 Hrs.]
6.1. Introduction
6.2. Development of School Building Design

Practical:

Unit 1. Site Selection and Analysis [8 Hrs.]
1.1. Decide project and select the site for the school design/commercial building design in small scale.
1.2. Analyze the Micro climate – Sun, wind, rain, humidity, precipitation (Consider openings – doors & windows for light, cross ventilation & thermal comfort. Positive and negative effect and analysis of existing landscape elements of site & surroundings - Panoramic views, terrain, natural vegetation etc.).

Unit 2. Case Study and Literature Review [8 Hrs.]
2.1. Collect and review the books, articles, manuals and other publications on school or commercial building design.
2.2. Select the case study -school/commercial building and visit the sites for case study

Unit 3. Program Formulation [4 Hrs.]
3.1. Formulate the Program –Spatial need and requirements.

Unit 4. Concept Design [8 Hrs.]
4.1. Prepare the bubble diagram to show the functional relationship between activities; inter-relationship of spaces
4.2. Develop the zoning in the site plan.
4.3. Prepare the Conceptual Design

Unit 5. Design Development [8 Hrs.]
5.1. Prepare the Floor Plan considering proper spaces and service, circulation and linking spaces.
5.2. Incorporate the Cultural, Social, Environmental and Traditional Values - Evolution of form in elevation.

5.3. Draw floor plans and design with functional & efficient spaces, Technology – Availability of materials and appropriateness of construction method structure type.
5.4. Develop all necessary plans, 4 elevations and 2 sections.

Unit 6. Cross sections, profile and 3D view development [8 Hrs.]

6.1. Draw profile section of the site
6.2. Develop 3D views/Perspective of the design

Unit 7. Final Design Development and Presentation [16 Hrs.]

7.1. Prepare and finalize the Site Plan.
7.2. Final Design & Drawings including Ground Floor Plan all typical Plans with, 4 Elevations & 2 Sections.
7.3. Profile section of the site, 3D views or Perspective view of the building.
7.4. Conduct Presentation of the final design.
7.5. Project Work: Internal Assignment: Design a Restaurant Building of capacity- 50.

References:

1. Nair P., Feilden, R., (2009), "The language of School Design: Design Patterns for 21st century Schools",
2. Woolner, P., (2014). "School Design Together" Routledg,
3. Beijing, I.S., (2012), School Architecture: Design for Elementary and Secondary", Phoenix.
4. Nikolas D, Davies, ErkkiJokiniemi, (2008), Dictionary of Architecture and Building Construction, Routl
5. Francis D.K. Ching - Visual Dictionary of Architecture, John Wiley & Sons
6. Architecture: Form, Space, & Order - Francis D.K. Ching
7. Joseph De Chiara - Time-Saver Standards for Building Types, McGraw-Hill Donald Watson - Time-Saver Standards for Architectural Design Data, McGraw-Hill
8. Government of Nepal, Building Bye-Laws of Kathmandu, 2064 BS.
9. Fedrick M., (2007), 101 Things I Learned in Architecture School, MIT Press.
10. Gurcharan. S., Jagadish. S., (2020), Building Planning Designing and Scheduling, Standard Publisher.

Working Drawing I
EG3107AR

Year: II **Total: 7 hours /week**
Part: II **Lecture: 1 hours/week**
Tutorial: hour/week
Practical: 6 hours/week
Lab: hours/week

Course Description:
This course is designed to help students on explanation of working drawing. It deals on role of working drawing, relation between Architecture design drawing and working drawing, and development of ability in preparing working drawing.

Course Objectives:
After the completion of this course students will be able to:
1. Describe/explain working drawing for construction.
2. Prepare a complete set of working drawing for construction purpose.

Course Contents:

Theory

Unit 1. Working Drawing **[5 Hrs.]**
- 1.1. Introduction
- 1.2. Types
- 1.3. Importance
- 1.4. Process of preparing drawing

Unit 2. Application of working drawing **[5 Hrs.]**
- 2.1. Process of Preparing contract document and specification
- 2.2. Coordination of working drawing and specification in site
- 2.3. Site supervision

Unit 3. Working drawing details **[5 Hrs.]**
- 3.1. Introduction
- 3.2. Set of architectural drawing
- 3.3. Set of structural drawing
- 3.4. Set of building service
  - 3.4.1. Sanitary drawing
  - 3.4.2. Electrical
  - 3.4.3. HVAC drawing

Practical: **[90 Hrs.]**
Sheet 1. Prepare working drawing of a residential building with details of: **[30 Hrs.]**
- 1.1. Plans: Ground floor, First floor, terrace (scale 1:50)
- 1.2. Elevations: 4 sides (scale 1:50)
- 1.3. Sections through staircase: cross & longitudinal (scale 1:50)
- 1.4. Entrance/lobby (scale 1:20)

Sheet 2. Wall section: **[8 Hrs.]**

2.1. Blow up detail of external/internal wall section from foundation footing to coping/ridge showing all necessary elements. (Scale: 1:20)
2.2. Blow up details such as sill, Lintel, cornice, coping. (Scale: 1:10)

Sheet 3. Draw Opening Detail (1:20/1:10) with opening schedule [8 Hrs.]
3.1. Main door: Elevation, section and blowup detail
3.2. Internal door: Elevation, section and blowup detail
3.3. Window: Elevation, section and blowup detail

Sheet 4. Draw Trench plan /foundation plan & section [20 Hrs.]
4.1. Trench Plan/setting out (1:50)
4.2. Foundation footing plan (1:50)
4.3. Foundation footing section (1:20)
4.4. Blow up details of 1.2 & 1.3 (1:10 & 1:20)

Sheet 5. Draw Structural plan of Column and Beam [8 Hrs.]
5.1. Reinforcement details of Column and Beam (cross & longitudinal) (1:20)

Sheet 6. Draw Staircase plan, elevation and section [8 Hrs.]
6.1. Sectional elevation with element such as handrail, baluster, blustered, steps and finishes. (1:10)
6.2. Reinforcement details of staircase (1:20)

Sheet 7. Draw reinforcement plan at Slab [8 Hrs.]
7.1. Reinforcement details of Typical Slab (cross & longitudinal) (1:50)

References:

1. Manual produced by Architectural form (complete drawing set),
2. Wakita, A.,&Linde,R. (2003).*The professional practice of architectural working drawing.* New York: John Wiley and Sons.
3. Porter, T. (year). *Architectural working drawing*. Charles Scribner and sons.
4. Chudley,R.,& Creeno, R. *Building Construction Hand Book*. Pearson Prientic Hall.
5. Frank,C .*Architectural Graphic, Pritoria Pictures of Building*
6. A complete set of working drawing - From architectural Form,
7. George,F. *Elaood, Problems in Architectural Drawing*.The Manual art press

Third Year/Second Part

S.N.	Code	Subject
1	EG3201AR	Building service II
2	EG3202AR	Reinforced Concrete Structures
3	EG3203AR	Computer Aided Drafting (CAD) III
4	EG3204AR	Building Construction III
5	EG3205AR	Working Drawing II
6	EG3206AR	Quantity surveying
7	EG3201MG	Entrepreneurship Development
8	EG3207AR	Project Work

Building Services II

EG3201AR

Year: III **Total: 5 hours /week**

Part: II **Lecture: 2 hours/week**

Tutorial: hour/week

Practical: 3 hours/week

Lab: hours/week

Course Description:

This module focuses on electrical system and design of the illumination, power circuits, safety and protection as per standard requirement and HVAC System. The range of information required and the graphical techniques used to convey such information; a very good understanding of the way building services are used in construction and the understanding of its details. Assignment in this module enhances practical knowledge about Electrical accessories, Electrical energy, Electric symbols, House appliances and building wiring.

Course Objectives:

After Completion of this course, students will be able to:

1. Introduce various systems of building services.
2. Explain the importance of building environment.
3. Correlate building services and the building users/occupants.
4. Develop an appropriate detail drawing of these building services.
5. Identify electric symbols and accessories;
6. Handle tools/equipment and its safety requirement of wiring system;
7. Identify major components of electrical system and its installation procedure.
8. Connect lighting circuits and signal circuits.

Course Contents:

Theory

Unit 1. Electricity **[16 Hrs.]**

1.1. Basic concept of electric current and voltage
1.2. Circuit
1.3. Types of circuits
  1.3.1. Open and short circuits
  1.3.2. Series and parallel circuits
1.4. Alternating current system and direct current system
1.5. Types of Alternating current system
  1.5.1. Single phase two wire system
  1.5.2. Two phase 3 wire system
  1.5.3. Three phase 3 wire system
  1.5.4. Four phase 4 wire system
1.6. General description of Electrical Distribution system, transformers, substation, service panels (MDB, SDB)
1.7. Electrical Installation
  1.7.1. Introduction
  1.7.2. Methods of distribution of electrical energy

1.7.2.1. Tree system
1.7.2.2. Distribution board system
1.7.3. Types of Wiring System
1.7.3.1. Cleat wiring
1.7.3.2. Wooden casing and capping wiring
1.7.3.3. PVC casing- capping wiring
1.7.3.4. Wooden batten wiring
1.7.3.5. Conduit wiring
1.7.3.6. General Rules for Wiring System and Code of Practice
1.7.3.7. Electrical Installation for Electrical Heating System, Air-conditioning System, lifts, escalators and pumps etc.

1.8. Safety and Protection in Electric System
1.8.1. Operation and Construction of Fuses, MCB and MCCB
1.8.2. Protective Devices Fuse
1.8.3. Types of fuses
1.8.3.1. Re- wire able fuse
1.8.3.2. High rupturing capacity fuse
1.8.3.3. Miniature circuit breaker
1.8.3.4. Moduled case circuit breaker

1.9. Earthing
1.9.1. Definition of electric shock
1.9.2. Effects of electric shock on human body
1.9.3. Levels of electric shock
1.9.4. Introduction of earthing
1.9.5. Function and application
1.9.6. Earthing methods and testing
1.9.7. Safety and precaution in earthing

1.10. Artificial Lighting System
1.10.1. Introduction
1.10.2. Terms Used in Lighting System
1.10.3. Laws of Illumination
1.10.4. Types of Lamps and Lighting Fixtures
1.10.5. Types of Lighting Schemes
1.10.6. Lighting System Consideration for different Occupancies
1.10.7. Design of Lighting Schemes
1.10.8. Methods of Lighting Calculation

1.11. Calculation of Light sub-circuit, power sub-circuit & Total Load

1.12. Introduction of Simple electrical drawings
1.12.1. Free hand plan/schematic diagram
1.12.2. Layout diagram
1.12.3. Wiring diagram.

1.13. Electric Symbols
1.13.1. Introduction
1.13.2. Types of symbols
1.13.3. Identification
1.13.4. Application

Unit 2. Ventilation and air conditioning **14 Hrs.**

2.1. Introduction
2.2. Functional requirements of ventilation system
2.3. Systems of Ventilation
  2.3.1. Natural Ventilation
  2.3.2. Mechanical Ventilation
2.4. Types of natural ventilation
  2.4.1. Wind effect
  2.4.2. Stack effect
2.5. General rules of natural ventilation
2.6. Mechanical ventilation
2.7. System of mechanical ventilation
  2.7.1. Extraction system
  2.7.2. Plenum system
  2.7.3. Extraction Plenum system
  2.7.4. Air conditioning
2.8. Refrigeration Cycles
2.9. Types of Air conditioning
  2.9.1. Window unit
  2.9.2. Split type
  2.9.3. Central AC
2.10. Essentials of comfort air conditioning
2.11. System of Air conditioning
2.12. Direct Expansion System
  2.12.1. Chilled water
2.13. Essentials of Air Conditioning System
  2.13.1. Filtration
  2.13.2. Heating
  2.13.3. Cooling
  2.13.4. Humidification
  2.13.5. Dehumidification
  2.13.6. Air Circulation or Distribution
2.14. Sick Building Syndrome
  2.14.1. Symptom of Sick Building Syndrome
  2.14.2. Causes of Sick Building Syndrome
  2.14.3. Solution of Sick Building Syndrome

Practical **[45 Hrs.]**

Unit 1. Electricity: **[24 Hrs.]**

1.1. **Report Submission** **[3 Hrs.]**
  1.1.1. Conduct market study, collect data, prepare report and conduct presentation on electrical lamps, appliances and equipment available in Nepal.
1.2. **Portfolio Submission** **[2 Hrs.]**
  1.2.1. Design lighting, power and distribution board for single storey building (light circuit design, power circuit design and detail design of distribution system)
    1.2.1.1. Calculate Light sub-circuit, power sub-circuit & Total Load **[3 Hrs.]**

1.2.1.2. Calculate the number of lights of each room. **[2 Hrs.]**

1.2.1.3. Sheet No. 1: Draw different types Electric Symbols such as Switches, sockets, luminaries, distribution board, fuse, MCB, MCCB etc. used in electric drawing. **[2 Hrs.]**

1.2.1.4. Sheet No. 2: Draw plan of ground floor to show Light circuit layout (with room names, dimension, and scale of drawing) **[3 Hrs.]**

1.2.1.4.1. Indicate the location of the lights, lighting switches, SBD, MBD, Meter etc.

1.2.1.4.2. Use proper symbols of the services.

1.2.1.5. Sheet No. 3: Draw plan of ground floor to show Power circuit layout (with room names, dimension, scale of drawing) **[3 Hrs.]**

1.2.1.5.1. Indicate location of the power sockets. Telephone points, TV points etc.

1.2.1.5.2. Use proper symbols of the services.

1.2.1.6. Sheet No. 4: Draw Single line Diagram for distribution board system **[2 Hrs.]**

1.2.2. Sheet No. 5: Draw single Line diagram, Schematic diagram / Circuit Diagram to show connection of the following Lighting Circuits. **[2 Hrs.]**

1.2.2.1. With one-way switch one light and one socket

1.2.2.2. With two-way switch two lights and two sockets

1.2.2.3. With intermediate switches, two fluorescent lamps

1.2.3. Sheet No. 6: Draw single Line diagram, Schematic diagram / Circuit Diagram to show connection of the following Lighting Circuits **[2 Hrs.]**

1.2.3.1. With Dimmer switches and incandescent lamps.

1.2.3.2. With time switches and lamps

1.2.3.3. With multi-position switches and incandescent lamps

1.2.4. Sheet No. 7: Draw single Line diagram, Schematic diagram / Circuit Diagram to show connection of the following Lighting Circuits: **[2 Hrs.]**

1.2.4.1. With electrical bell

1.2.4.2. With electric door opener

1.2.4.3. Ceiling fan with fan regulator

Unit 2. Ventilation and Air Conditioning on single storey residential Building: [21 Hrs.]

2.1. **Report Submission** **[3 Hrs.]**

2.1.1. Conduct market study, collect data and prepare report and presentation on mechanical ventilation available in Nepal:

2.2. **Portfolio Submission** **[18 Hrs.]**

2.2.1. Sheet No. 8: Draw plan of ground floor to show single split air condition one to one connection layout (with room names, dimension, scale of drawing) **[3 Hrs.]**

2.2.1.1. Indicate location of outdoor unit and indoor unit

2.2.1.2. Use proper symbols of the services.

2.2.2. Sheet No. 9: Draw section of residential building to show single split air condition one to one connection layout (with room names, dimension, scale of drawing) **[3 Hrs.]**

2.2.2.1. Indicate the location of outdoor unit and indoor unit
2.2.2.2. Use proper symbols of the services.

2.2.3. Sheet No. 10: Draw plan of ground floor to show multi split air condition layout (with room names, dimension, scale of drawing) **[3 Hrs.]**
2.2.3.1. Indicate the location of outdoor unit and indoor unit.
2.2.3.2. Use proper symbols of the services.

2.2.4. Sheet No. 11: Draw section of residential building to show multi split air condition one to one connection layout (with room names, dimension, scale of drawing) **[3 Hrs.]**
2.2.4.1. Indicate location of outdoor unit and indoor unit.
2.2.4.2. Use proper symbols of the services.

2.2.5. Sheet No. 12: Draw plan of ground floor to show Central air-conditioned layout (with room names, dimension, scale of drawing) **[3 Hrs.]**
2.2.5.1. Indicate location of outdoor unit and indoor unit
2.2.5.2. Use proper symbols of the services.

2.2.6. Sheet No. 13: Draw section of residential building to show Central air-conditioned layout (with room names, dimension, scale of drawing) **[3 Hrs.]**
2.2.6.1. Indicate the location of air handling unit, supply duct, and return air duct, diffusers, and indoor unit.
2.2.6.2. Use proper symbols of the services

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Electricity	16	21
2	Ventilation and air conditioning	14	19
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Chudley, R. and Greeno R., (2004), Building construction handbook, Oxford: Elsevier Butterworth-Heinemann.
2. Purnima B.C., Jain A.K & Jain A.K, (2008), Building Construction, 11th Edition, Laxmi Publications.
3. Johnson, J.W. (1990), Domestic Construction Manual (Sections K & L), Master Builders Association, West Perth.
4. Rawlinsons, Rawlinsons, (1989), Australian Construction Handbook, Perth, Rawlhouse Publishing.
5. Jain & Jain (nd),"ABC of Electrical Engineering" Dhanpat Rai Publishing Company, New Delhi.
6. Malla N.B., (nd), Introduction of Electricity Vol. I
7. Malice S. K., (nd), Electric Trade Theory and Practical
8. Gupta, J.B., (nd)Electrical Installation, Estimating and Costing, S.K. Katari& Sons, New Delhi

Reinforced Concrete Structures

EG3202AR

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

Part: II **Lecture: 2 hours/week**

Tutorial: hour/week

Practical: 2 hours/week

Lab: hours/week

Course Description:

This course provides the general ideas and design of RC members using relevant codes of practice. After completion of this course, students must be able to supervise RC constructions and he should be able to design simple RC members and prepare detail drawings of reinforcements in foundation, columns, beams, slabs and also able to prepare ductile detailing of beam-column joints, column bases and bar bending schedule.

Course Objectives:

After the completion of this course students will able to:

1. Identify proper selection and calculate the design parameters for the materials.
2. Design structural elements of RCC: Slabs, beams, columns by LSM.
3. Understand the concept of RC elements and codal provisions.
4. Develop the proper detailing of RC structural elements.

Course Contents:

Theory

Unit 1. Introduction of Reinforced Concrete [2 Hrs.]

1.1. Concept of Reinforced Cement Concrete (RCC)
1.2. Different grades of cement and steel
1.3. Properties of Plain Cement Concrete (PCC)
1.4. Limitations of use of Plain Cement Concrete (PCC)
1.5. Various types of load and stresses in Reinforced Concrete Structure

Unit 2. Working Stress Method of Design [4 Hrs.]

2.1. Basic assumption in working stress design
2.2. Modular ratio, permissible stresses, ultimate stresses and factor of safety
2.3. Working load in concrete and steel
2.4. Stress strain diagram, actual and critical neutral axis (NA), position of NA, Lever Arm, Moment of Resistance (MoR)
2.5. Behavior of beam
2.6. Under reinforced, over reinforced and balanced sections
2.7. Types of reinforced concrete beam
2.8. Introduction to Flanged beams

Unit 3. Limit State Method of design [5 Hrs.]

3.1. Concept of different limit states and assumptions made in limit state of collapse
3.2. Limit state of strength and serviceability
3.3. Safety and serviceability requirements/deflection control of structural elements as per codes
3.4. Partial safety factor for loads

3.5. Partial safety factor for strength
3.6. Design strength of materials and design loads
3.7. Stress-strain curves for concrete and steel
3.8. Idealized stress-strain diagrams for steel and concrete

Unit 4. Design of Shear (Introduction only) [2 Hrs.]

4.1. Shear stress
4.2. Diagonal tension
4.3. Design of Shear reinforcement
4.4. Determination of area and spacing of stirrups
4.5. Bond strength and development length

Unit 5. Design by the Limit State Method [15 Hrs.]

5.1. Singly and Doubly Reinforced Beam
5.2. T- Beams
5.3. Simply supported (One-way and Two-way Slabs)
5.4. Axially Loaded short Column with lateral ties
5.5. Design Concept of spread footings

Unit 6. Introduction to Pre-stressed concrete [2 Hrs.]

6.1. Concept of pre-stressing
6.2. Materials used in pre-stressed concrete and their requirements
6.3. Methods of pre-stressing
6.4. Systems of pre-stressing
6.5. Losses in pre-stress
6.6. Merits and demerits of pre-stressing

Practical: [30 Hrs.]

1. Draw singly reinforced rectangular beams with reinforcements detailing
2. Draw doubly reinforced rectangular beams with reinforcements detailing
3. Draw singly reinforced T– beams with reinforcements detailing
4. Draw One-way slabs (simply supported and cantilever) with reinforcements detailing
5. Draw Two-way slab (Simply supported) with reinforcements detailing
6. Draw Short and long columns (axially loaded) with reinforcements detailing
7. Draw a simple pad footing for columns with reinforcements detailing
8. Draw a column-beam joint showing bars as per ductile detailing code requirement
9. Prepare the bar bending schedule for all RC drawings

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction of Reinforced Concrete	2	3
2	Working Stress Method of Design	4	5
3	Limit State Method of design	5	6
4	Design of Shear (Introduction only)	2	3
5	Design by the Limit State Method	15	20
6	Introduction to Pre-stressed concrete	2	3
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References

1. IS 456-2000 Plain and Reinforce Concrete-Code of practice. New Delhi: BUREAU of INDIAN STANDARDS.
2. Jain, A. (2012). Reinforced Concrete(Limit State Method) (7 th ed.). New chand & Bros.
3. KALE, C., & SHAH, M. (2014). RCC Theory and Design. New Delhi: Laxmi Publication.
4. Nepal Building Code. Kathmandu: नेपाल सरकार शहरी बिकास मन्त्रालय.
5. Sharma, N. (2009). R.C.C. Design and Drawing. New Delhi: S.K. KATARIA & SONS.
6. SP 16:1980 Design Aids for Reinforced Concrete . New Delhi : BUREAU of INDIAN STANDARDS.
7. Suwal, D. R. (2103). *Design of Reinforced Concrete Structures.* Kathmandu: A.K. Book Publication.

**** Note: IS: 456 is allowed in the examination.***

Computer Aided Drafting (CAD) III

EG3203AR

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

Course Description:
This course orients the student to create three-dimensional objects in space with special emphasis on presentation and visualization of interiors and exteriors of building using different rendering techniques using CAD or sketch up.

Course Objectives:
After the completion of this course students will be able to:
1. Convert 2D objects to 3D object.
2. Represent a design by creating solid primitives, solid or surface models.

Course Contents:

Theory

Unit 1. 3D Model **[1 Hrs.]**
- 1.1. Introduction to 3D
- 1.2. Types of 3D models. (Wire frame, surface, solid)
- 1.3. 3D coordinate system. (Spherical, cylindrical)

Unit 2. Viewing **[2 Hrs.]**
- 2.1. Viewing 3D objects
- 2.2. Isometric drawing

Unit 3. Modeling **[3 Hrs.]**
- 3.1. Region and 3D faces
- 3.2. 3D solids (Box, cone, cylinder)
- 3.3. 3D solid modeling
- 3.4. Creating Extrude solids
- 3.5. Boolean operations (Union, subtract, intersection)

Unit 4. Editing **[3 Hrs.]**
- 4.1. Editing and modifying 3D solids
- 4.2. rotate 3D, mirror 3D, 3D arrays, Align
- 4.3. Advanced modifying tool
- 4.4. Fillet, chamfer, slice

Unit 5. Adding materials on 3D **[3 Hrs.]**
Unit 6. Lighting and Rendering **[3 Hrs.]**

Practical **[45 Hrs.]**
1. Develop3D models of geometric solids. **[6 Hrs.]**

2. Develop 3D furniture (table, sofa, chair bed, lamp) **[9 Hrs.]**
3. Extrude walls of floor plans with doors windows and stair **[9 Hrs.]**
4. Complete a 3D model of a residential Building with assigning material and lighting and Rendering. **[21 Hrs.]**

References:

1. Singh, V.P. (2019). *AutoCAD2019.* Computech Publications Ltd.
2. Omura, G; Benton, B.C. (2015). *Mastering AutoCAD 2016 auto Autocad LT 2016.* Sybex

Building Construction III

EG3204AR

Year: II **Total: 6 hours /week**
Part: II **Lecture: 2 hours/week**
Tutorial: hour/week
Practical: 4 hours/week
Lab: hours/week

Course Description:
This course intends to provide knowledge and skills on building construction work such as temporary construction, steel structure, traditional timber structure, ceiling, joints in concrete, fireplace and chimney.

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

1. Explain the construction techniques of building and their components.
2. Identify the various details for an application in construction works.

Course Contents:

Theory

Unit 1. Temporary construction works **[8 Hrs.]**

1.1. Scaffolding
  1.1.1. Double scaffold
  1.1.2. Cantilever & other
1.2. Formwork for cement concrete (PCC/RCC)
  1.2.1. Slabs
  1.2.2. Beams
  1.2.3. Columns
1.3. Shoring
  1.3.1. Functions, types and construction methods and detailing
1.4. Underpinning works (foundation/wall)

Unit 2. Steel structures **[4 Hrs.]**

2.1. Shapes of structural steel.
2.2. Riveting, bolting and welding.
2.3. Types of steel structural members, beam, columns and girders.

Unit 3. Traditional Timber Construction **[6 Hrs.]**

3.1. Introduction.
3.2. Elements such as: posts, doors, windows, roofs.
3.3. Construction process and repairing methods.

Unit 4. Joints in concrete **[4 Hrs.]**

4.1. Expansion joints.
4.2. Construction joints.

Unit 5. Ceiling (Bonded/False) **[4 Hrs.]**

5.1. False ceiling

5.2. Under framing in wood
5.3. Finish plywood, planks and gypsum board etc.

Unit 6. Fireplaces and Chimneys [4 Hrs.]

6.1. Terminologies, design and parameters.
6.2. Construction details and performances.

Practical: [60 Hrs.]

Sheet 1: Draw Timber Scaffolding [6 Hrs.]
(Brick layers, mason's, needle scaffolding)

Sheet 2: Draw Steel Scaffolding [6 Hrs.]
(Tubular steel putlog and independent, truss-out, mobile tower, fitting details)

Sheet 3: Draw Timber Formwork [6 Hrs.]
(Column formwork, column yokes and clamps, column forms and yokes, beam and slab formwork)

Sheet 4: Draw Timber Shoring [6 Hrs.]
(Racking, flying and dead shore, intersection details)

Sheet 5: Draw Under pinning [6 Hrs.]
(Tradition brick, needle and pile underpinning)

Sheet 6: Draw Steel structure [6 Hrs.]
(Different sections, column base, beam to column connection, column splices, beam to beam connection)

Sheet 7: Draw Traditional Timber Structure [6 Hrs.]
(Section of traditional timber house, details of column, beam, floor plank, roof, eaves, lattice window, repair of column and rafter)

Sheet 8: Draw Joints in concrete [6 Hrs.]
(Expansion joint in RCC framed structure, detail at foundation, floor and roof, filler and water bar, construction joint and details)

Sheet 9: Draw Suspended Ceiling [6 Hrs.]
(Jointless, paneled, decorative and open suspended ceiling, support details)

Sheet 10: Draw Fireplace and Chimney [6 Hrs.]
(Open fireplace, flue, outlet details, fireplace recess, chimney at pitch roof)

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Temporary construction works	8	12
2	Steel structures	4	5
3	Traditional Timber Construction	6	8
4	Joints in concrete	4	5
5	Ceiling (Bonded/False)	4	5
6	Fireplaces and Chimneys	4	5
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. Kumar, S. (2014). *Building construction* (20th ed.). Standard Publishers and Distributors.
2. Punmia, Dr. B. C. (2008). *Building Construction*. Laxmi Publications.
3. Arora S.P and Bindra Dr. S.P. (n.d.), *The Text Book of Building construction*, Dhanpat Rai Publication.
4. Grundy, J. T. (1977). *Construction Technology*. Intl Ideas.
5. Chudley, R. (Ed.). (1987). *Construction Technology* (Vol. 1-4). Longman Scientific & Technical.
6. King H and Nield D. (Ed.). (1967). *Building Techniques* (Vol. 1). Spon.
7. Mckay, J. K. (Ed.). (1969). *Building Construction* (2nd ed., Vol. 1). Longman.
8. Mckay, W. B. (Ed.). (1970). *Building Construction* (5th ed., Vol. 1).

Working Drawing II
EG3205AR

Year: III **Total: 6 hours /week**
Part: II **Lecture: hours/week**
Tutorial: hour/week
Practical: 6 hours/week
Lab: hours/week

Course Description:
This course is designed to help students to acquire knowledge and skills on water supply and public health, sanitation, environment and public health, house plumbing and electrical lay out system.

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

1. Interpret the Water supply and public Health, sanitation, environment and public health, House plumbing and electrical lay out system.
2. Make a set of working drawing of water supply and drainage system and electrical layout system of residential and public building.
3. Familiarize with the basic electric system
4. Relate/ describe safety and protection of electric system.
5. Layout the light and power circuit.

Course Contents:
Practical:

Unit 1. Position the Site Plan (scale 1:100) **[8 Hrs.]**
- 1.1. Soil manhole
- 1.2. Waste water manhole
- 1.3. Grease trap
- 1.4. septic tank
- 1.5. soak pit
- 1.6. Water reservoir tank at site plan

Unit 2. Lay out Floor Plans (scale 1:100) **[16 Hrs.]**
- 2.1. Lay the sanitary appliances at kitchen and toilet
- 2.2. Connect the soil and waste water pipe line to sanitary appliances
- 2.3. Connect the cold and hot water pipe line to sanitary appliances

Unit 3. Lay out Terrace Plan (scale 1:100) **[8 Hrs.]**
- 3.1. Install the cold-water roof tank, hot water cylinder and solar panel
- 3.2. Position the rain water pipe at roof
- 3.3. Draw the schematic diagram of Hot and cold water

Unit 4. Lay out the Details of Bathroom and kitchen **[25 Hrs.]**
- 4.1. Fixtures layout plan (1:20)
- 4.2. Elevations and section (1:20)
- 4.3. Details as necessary (1:10)

4.4. Hot/cold water pipe layout (1:10)
4.5. Soil/waste water pipe layout (1:10)

Unit 5. Lay out Manhole, septic tank, soak pit and grease trap (scale 1:20) [8 Hrs.]

5.1. Plan and section of manhole
5.2. Plan and section of septic tank
5.3. Plan and section of soak pit

Unit 6. Lay out Schematic diagram at floor plan: (scale 1:100) [25 Hrs.]

6.1. Plan of residential building showing electrical layout
6.2. Plan of residential building showing Power circuit layout
6.3. Signal line diagram distribution board system

References:

1. Bachmann, A. & Waldvogel, H.) *Balaju: Drinking water installation and drainage requirement in Nepal, Mechanical Training Centre, (MTC)*
2. Birdie, G.S. & Bridie I.S., *water supply and sanitary engineering*,
3. Woolley, L. London*: Sanitation details*,
4. Spence, W, P. *Architectural Working Drawing: Residential and Commercial Building*.John Wiley and sons

Quantity Surveying

EG3206AR

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

Part: II **Lecture: 2 hours/week**

Tutorial: hour/week

Practical: 2 hours/week

Lab: hours/week

Course Description:

This course focuses on familiarization of quantity surveying and estimating of building works.

Course Objectives:

On completing of this course, the student will be able to:

1. Explain the procedures of estimating building works
2. Classify the types of estimation.
3. Prepare the estimating of building works

Course Contents:

Theory

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

- 1.1. Definition of estimate
- 1.2. Purpose of estimating
- 1.3. Units of measurement
- 1.4. Definition of terms
  - 1.4.1. Plinth area, Carpet area
  - 1.4.2. Contingency
  - 1.4.3. Bill of quantities
  - 1.4.4. Abstract of cost
  - 1.4.5. Administrative approval
  - 1.4.6. Technical sanction
  - 1.4.7. Work charged establishment

Unit 2. Types of Estimates **[4 Hrs.]**

- 2.1. Approximate estimate
- 2.2. Supplementary estimate
- 2.3. Plinth area estimate
- 2.4. Detailed estimate
- 2.5. Revised estimate

Unit 3. Methods of Estimating **[4 Hrs.]**

- 3.1. Long wall and short wall method
- 3.2. Centre line method
- 3.3. Methods of measurement of various works
- 3.4. Methods of taking out quantities of building works
- 3.5. Preparation of detailed estimate

Unit 4. Analysis of rate **[6 Hrs.]**

4.1. Purpose of analysis of rate
4.2. Procedure of analysis of rate
4.3. Factors affecting analysis of rate
4.4. Rate analysis norms and district rates
4.5. Preparing analysis of rate for building works (Earth work, Brick masonry work,
4.6. PCC work, RCC work, Stone masonry work, Plaster work)

Unit 5. Valuation [6 Hrs.]

5.1. Definition
5.2. Purpose of valuation
5.3. Principle of valuation
5.4. Factors affecting the value of the propose
5.5. Method of valuation and writing valuation report

Unit 6. Specifications [8 Hrs.]

6.1. Purpose of specification
6.2. Technique of specification writing
6.3. Detailed specification for
  6.3.1. Brick masonry work
  6.3.2. Stone masonry work
  6.3.3. Formwork
  6.3.4. PCC work
  6.3.5. RCC work
  6.3.6. Plaster work
  6.3.7. Roofing work for pitched roofs
  6.3.8. Woodwork for doors and windows frames and shutters

Practical [30 Hrs.]

Taking out detailed quantities and preparing estimate for the following:

1. Perform estimate of a wall
2. Perform estimate of one room building with RCC flat roof
3. Perform estimate of one roomed building (having verandah) with RCC flat roof.
4. Estimate two roomed RCC framed structured building
5. Perform estimate of a pitched coupled roof
6. Perform estimate of a dog legged staircase
7. Perform estimate of footing, RCC beam, column and slab
8. Perform estimate of stone and brick masonry retaining walls
9. Perform estimate of septic tank and soak pit
10. Carryout estimate of a three or a four roomed building
11. Evaluate report of existing property

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	2	3
2	Types of Estimates	4	5
3	Methods of Estimating	4	5

4	Analysis of rate	6	8
5	Valuation	6	8
6	Specifications	8	11
	Total	**30**	**40**

* There could be minor deviation in mark distribution.

References:

1. N. Dutta, Estimating and Costing, Amazon Asia-Pacific Holdings Private Limited
2. M. Chakraborty' Estimating, Costing, Specification and Valuation in Civil Engineering, easyengineering.net
3. Textbook of Estimating and Costing, by Gs Birdie, Dhanpat Rai Publishing Co (P) Ltd

Entrepreneurship Development
EG 3201 MG

Year: III **Total: 5 Hrs. /week**
Semester: II **Lecture: 3 Hrs./week**
Tutorial: Hr./week
Practical: 2 Hrs./week
Lab: Hrs./week

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

Course Objectives:
After completion of this course students will be able to:
1. Understand the concept of business and entrepreneurship;
2. Explore entrepreneurial competencies;
3. Analyze business ideas and viability;
4. Learn to formulate business plan with its integral components and
5. Manage small business.

Course Contents:

Theory

Unit 1: Introduction to Business & Entrepreneurship: [9 Hrs.]
- 1.1 Overview of entrepreneur and entrepreneurship
- 1.2 Wage employment, self- employment and business
- 1.3 Synopsis of types and forms of enterprises
- 1.4 Attitudes, characteristics & skills required to be an entrepreneur
- 1.5 Myths about entrepreneurs
- 1.6 Overview of MSMEs (Micro, Small and Medium Enterprises) in Nepal

Unit 2: Exploring and Developing Entrepreneurial Competencies: [9 Hrs.]
- 2.1 Assessing individual entrepreneurial inclination
- 2.2 Assessment of decision-making attitudes
- 2.3 Risk taking behavior and risk minimization
- 2.4 Creativity and innovation in business
- 2.5 Enterprise management competencies

Unit 3: Business identification and Selection: [4 Hrs.]
- 3.1 Sources and method of finding business idea(s)
- 3.2 Selection of viable business ideas
- 3.3 Legal provisions for MSMEs in Nepal

Unit 4: Business plan Formulation: **[18 Hrs.]**

4.1 Needs and importance of business plan

4.2 Marketing plan

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

4.3 Business operation plan

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

4.4 Organizational and human resource plan

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

4.5 Financial plan

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

4.6 Business plan appraisal

- Return on investment
- Breakeven analysis
- Risk factors

Unit 5: Small Business Management: **[5 Hrs.]**

5.1 Concept of small business management

5.2 Market and marketing mix

5.3 Basic account keeping

Practical

Unit 1: Overview of Business & Entrepreneurship **[2 Hrs.]**

1. Collect business information through interaction with successful entrepreneur

Unit 2: Exploring and Developing Entrepreneurial Competencies **[2 Hrs.]**

- Generate innovative business ideas

Unit 3: Product or service Identification and Selection **[2 Hrs.]**

1. Analyze business ideas using SWOT method

Unit 4: Business Plan Formulation **[22 Hrs.]**

1. Prepare marketing plan
2. Prepare operation plan
3. Prepare organizational and human resource plan
4. Prepare financial plan
5. Appraise business plan
6. Prepare action plan for business startup

Unit 5: Small Business Management **[2 Hrs.]**

1. Prepare receipt and payment account
2. Perform costing and pricing of product and service

Project Work

EG3207AR

Year: III **Total: 6 hours /week**

Part: II **Lecture: hours/week**

Tutorial: hours/week

Practical: 6 hours/week

Lab: hours/week

Course Description:

This course is designed to help students to apply knowledge and skills in developing a commercial building in an urban context.

Course Objective:

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

1. Design a complex building independently.

Course Contents:

Practical:

Unit 1. Site Selection and Analysis [9 Hrs.]

1.1. Decide and select the site for the project Commercial or Residential or Secondary school (1500 to 2000sft. max. 3 storey).

1.2. Analyze the Site Considering the Site Condition and Climatic condition.

Unit 2. Case Study and Literature Review [12 Hrs.]

2.1. Collect and review the books, articles, manuals and other publications on relative project

2.2. Select the case study and visit the sites for case study

Unit 3. Program Formulation [6 Hrs.]

3.1. Formulate the Program –Spatial need and requirements.

Unit 4. Concept Design [9 Hrs.]

4.1. Prepare the bubble diagram to show the functional relationship between activities; inter-relationship of spaces

4.2. Develop the zoning in the site plan

4.3. Prepare the Conceptual Design

Unit 5. Design Development [24 Hrs.]

5.1. Prepare the Floor Plan considering proper spaces and service, circulation and linking spaces.

5.2. Incorporate the Cultural, Social, Environmental and Traditional Values - Evolution of form in elevation.

5.3. Draw floor plans and design of functional & efficient spaces, Technology – Availability of materials and appropriateness of construction method structure type.

5.4. Develop all necessary floor plans, 4 elevations and 2 sections.

Unit 6. Cross sections, profile and 3D view development [12 Hrs.]

6.1. Draw profile section of the site

6.2. Develop 3D views/Perspective of the design

Unit 7. Final Design Development and Presentation [18 Hrs.]

7.1. Prepare and finalize the Site Plan Final Design & Drawings including Ground Floor Plan all typical Plans with, 4 Elevations & 2 Sections.

7.2. Profile section of the site, 3D views or Perspective view of the building.

7.3. Conduct Presentation of the final design.

References:

1. Watson, D. (1997). Time-Saver Standards for Architectural Design Data, McGraw-Hill.
2. Ching, Francis. D.K. (1995). Visual Dictionary of Architecture. John Wiley & Sons.

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