DESIGN STUDIO I
AR 101

Lecture : 2   **Year : I**
Tutorial : 0   **Part : I**
Practical : 8

Course Objectives:
This course aims to provide students with a solid foundation in architectural design by teaching them the basic principles of elements, space, form and order. Students will also learn how to apply their creativity and innovation to various design projects, and how to use different materials to make models. Through hands-on exercises, students will develop their design skills, critical thinking and problem-solving abilities, which are essential for the field of architecture.

1   Introduction   **(8 hours)**

    1.1   Design Elements: The fundamental components points, line and plane to be used in visual arts and design to understand these elements for creating effective and visually engaging designs.
        1.1.1   Point
        1.1.2   Line
    1.2   Forms: To create the two- dimensional and three-dimensional shapes that forms a composition.
        1.2.1   Plane (Two Dimensional)
        1.2.2   Solid (Three Dimensional)
        1.2.3   Inter-relations (explore the connections between points, lines, planes, and solids, providing a comprehensive understanding of form in visual perception and design.)

2   Design Principles of Composition   **(8 hours)**

    2.1   Principles of Composition
        2.1.1   Axis
        2.1.2   Symmetry
        2.1.3   Hierarchy
        2.1.4   Datum
        2.1.5   Repetition
        2.1.6   Transformation
    2.2   Salient Features of Composition: To compose an architectural design, achieving a harmonious and visually appealing composition using several key elements (1.1 and 2.1)
        2.2.1   Unity and Balance
        2.2.2   Scale and Proportion
        2.2.3   Mass and Void

3   Spatial Understanding of Architectural Components   (8 hours)

  3.1   Measured Drawing
  3.2   Form Development
  3.3   Design Development
  3.4   Model Making

4   Project   (6 hours)

  4.1   Final Project "Architectural Elements Exploration" (Familiarize with
          fundamental architectural elements and its design principles.)
  4.2   Outcome of the project: Students gain a foundational understanding of
          architectural elements, principles of composition, and effective
          presentation skills

Practical   (120 hours)
  1.   Simple sketches that explore the concept of a point with variations in size,
         spacing, and arrangement.
  2.   Lines and their expressions playing with different line types, lengths, and
         orientations
  3.   Explore the concept of planes through the creation of simple 2D shapes
         with variations in size, orientation, and arrangement.
  4.   Explore three-dimensional space by creating basic solid forms (cubes,
         spheres, pyramids) and experiment with light and shadow to emphasize
         the solidity of the forms.
  5.   Composite composition of the previously learned elements and create
         visual arrangements that showcase the relationships between points, lines,
         planes, and solids.
  6.   Principles of each composition and its each salient features
  7.   Measured drawing of simple existing space (e.g., a room, corridor) with
         accurate dimensions, proportions, and details of the selected space.
  8.   Analyze the measured drawings and identify key spatial elements.
         Experiment with different geometric forms and layouts inspired by the
         existing space.
  9.   Analysis on historical and cultural significance of the chosen architectural
         element.
  10.   Sketching and Model Making:
         Create detailed sketches and small-scale models representing different
         designs of the chosen architectural element
  11.   Presentation of sketches, drawing details and its analysis with models and
         explaining design choices and influencing factors
  Final Project: A project work with field visit should be done in Nepalese context
  to understand use of basic elements (e.g., door, window, staircase etc.) in
  Architectural Practice.
  Medium of Presentation: Poster Presentation, Models, Digital Applications etc.

Note: *Creative Corner: For creativity there are class works integrated with the above units. For Examples: 1. Poster Design, 2. Collage based on thematic statement. 3 Model making based on scraped materials: Sculpture /Abstract*

References
1. *Ching D.K (2022). Architecture Graphics. John Wiley & Sons.7th Edition*
2. *Ching, D.K (2014). Architecture Form, Space, and Order. John Wiley & Sons.*
3. *Geoffrey Makstutis (2018) Design Process in Architecture: From Concept to Completion*
4. *Gill, R. W. (2011). Rendering with pen and ink. London: Thames and Hudson.*
5. Jain R (2010), "Relationship between the Design Ideology and ways of expressing it through work of Zaha Hadid". Nagpur: MM College of Architecture.
6. Telang M. (2005), Aesthetics, Basic Design and Creativity in Architecture, Pune: Sinhagad College of Architecture.

INTRODUCTION TO ARCHITECTURE
AR 102

Lecture	: 2	**Year : I**
Tutorial	: 0	**Part : I**
Practical	: 0	

Course Objectives:

This course aims to provide students with a comprehensive introduction to the field of architecture and its relation with society, culture, religion, technology, political and the built environment. Students will also gain an understanding of the profession of architecture, its scope and opportunities, its relation with other professions, and the rules and regulations of architecture in Nepal.

1   Introduction to the field of architecture   (2 hours)

1.1   General Definition of Architecture, Definition by pioneer /master architects

1.2   Architectural education in Nepal

2   Architecture, built environment and the society   (6 hours)

2.1   Built Environment

    2.1.1   Definition of Built Environment

    2.1.2   Internal and External Built Environment

    2.1.3   Three Concepts of Siegfried Gideon with respect to Architecture and Built Environment

2.2   Building and Society – Buildings evolution as social needs, values and society

2.3   Architecture and its societal objectivity and responsibility

    2.3.1   Architecture and its Interpretation (semantics)

    2.3.2   Architecture and its role in achieving societal purpose.

3   Social cultural and religious context of architecture   (5 hours)

3.1   Social Context : Social influences in Architectural Development

    3.1.1   Architectural manifestations: Cave House, House of Labor's at Kahun, Newar's House, Igloo House, Palace, Agora.

3.2   Religious Context: Architectural development based on religious beliefs and way of worship

    3.2.1   Architectural manifestations: Temples, Churches, Mosque, Pyramid Parthenon of Greek, Great temple of Egypt

3.3   Cultural Context: Notions of cultural accretions and architectural development

    3.3.1   Architectural manifestations: The roman accretions of ornamentations; Nepalese architecture from Lichhavi to Malla period

4   Technology and Material Context of Architecture   (4 hours)

    4.1   Brief Introduction to technology and material use in Different Periods of Architecture: Prehistoric to Contemporary period

    4.2   Brief Introduction to technology and material use in traditional Nepalese (Newar) Architecture (Malla period Residences and Temples)

5   Site City and Ecological Context of Architecture   (2 hours)

    5.1   Civic Architecture

    5.2   Architecture and public spaces

6   Site City and Ecological Context of Architecture   (5 hours)

    6.1   Site and its Nature

        6.1.1   Site as determinants

        6.1.2   Site and its socio-cultural factors

    6.2   Site, Environment and Ecology

        6.2.1   Religious

        6.2.2   Symbiotic relationships

        6.2.3   Exploitative

    6.3   Brief Introduction to Sustainable Design, Ecological Sustainability and Green Building Design

7   Architecture and its relationship with allied professionals; Role and Relation of Architect, Client and Contractor   (2 hours)

8   The Profession of Architecture in Nepal (since 1950s)   (2 hours)

    8.1   Career opportunities in Public and Private Sector; In Nepalese Context

9   Planning and Building Controls, Bye-laws   (2 hours)

    9.1   Brief Introduction to land use planning and zoning

    9.2   Building Bye Laws – GCR, FAR, Set back, ROW, Light Plane

    9.3   National Building Code

Assignments

1.   Presentation and report on different structures with respect to Different Periods of Architecture focusing on physical aspects, socio cultural and religious aspects, material and technology.

2.   Presentation and report on different structures Nepalese context focusing on physical aspects, socio cultural and religious aspects, material and technology.

Reference

1. F.D.K. Ching, A Visual Dictionary of Architecture, 19th Edition. New York: VNR Publications, 1997.
2. B. Fletcher, A History of Architecture, 20th Edition. India: CBS,1999
3. W.G. Korn ,Traditional Architecture of Kathmandu Valley, Nepal: Ratna Pustak Bhandar, 2007
4. J. Gympel , The Story of Architecture - From Antiquity to the Present , Imago Publishing Ltd: 1996
5. J. Pallasmaa, The Eyes of the Skin, 3rd Edition. Wiley Publication ,2012
6. National Building Code, Building Bye Laws
7. Building and Society: Essays on the social Development of the Built Environment, 1st edition, Anthony D.King(1980)

BUILDING MATERIAL I
AR 103

Lecture : 3   **Year : I**
Tutorial : 1   **Part : I**
Practical : 0

Course Objectives:
The course objective is to enable the students to select and use suitable building materials for various construction projects. The course covers different materials and their characteristics, production, quality, testing and application along with market survey and analysis techniques of the latest market scenario of building material.

1   Introduction   **(2 hours)**

     1.1   Building Materials & its importance in architecture and engineering
     1.2   Objective of Building material study

2   Stone   **(8 hours)**

     2.1   Introduction
     2.2   Sources of Stone
           2.2.1.   General knowledge on types of rocks according to geological formation
                2.2.1.1.   Igneous rock
                2.2.1.2.   Sedimentary rock
                2.2.1.3.   Metamorphic rock
           2.2.2.   Types of rocks by physical properties
           2.2.3.   Types of rocks by chemical properties
           2.2.4.   Types of rocks by hardness
     2.3.   Quarrying of Stone
           2.3.1.   Types of quarrying
                i)Quarry by hand
                ii)Quarry by machine
                iii)Quarry by blasts
     2.4.   Seasoning, Defects and Preservation of stone
     2.5.   Dressing of Stone
           2.5.1.   Hammer dressing
           2.5.2.   Chisel drafted margin
           2.5.3.   Tooling and axing
                2.5.4.   Fine tooling
                2.5.5.   Rubbed and polished work
                2.5.6.   And other new technologies.
     2.6.   Stone masonry
           2.6.1.   Types

2.6.2. General principles to be observed in the construction
2.6.3. Comparison between Brick and Stone Masonry
2.7. Selection and uses of Stone for Engineering and Architectural Works
2.8. Artificial Stones

3   Brick   (7 hours)

3.1   Introduction
3.2   Types of Bricks (traditional/modern)
3.3   Constituents of Brick Earth
3.4   Brick Making Process
    3.4.1. Hand making process
    3.4.2. Machine making process
3.5.   Characteristics of Good Bricks & Sizes
    3.5.1. A class Brick
    3.5.2. B class Brick
    3.5.3. C class Brick and so on
3.6.   Testing of Brick
    3.6.1. Water absorption test
    3.6.2. Compressor strength test
    3.6.3. Tensile strength test
    3.6.4. Lab and field test

4   Lime   (3 hours)

4.1   Introduction, Constituents of lime
4.2   Classification of lime
4.3   Types of lime and their comparisons
4.4   Properties of Lime
4.5   Uses of lime

5   Sand   (3 hours)

5.1   Introduction
5.2   Classification and uses
5.3   Bulking of sand
5.4   Characteristics of good sand
5.5   Substitutes of sand

6.   Cement   (10 hours)

6.1   Introduction and constituents of cement
6.2   Properties of good cement
6.3.   Manufacturing process of cement
    6.3.1.   Dry process
    6.3.2.   Wet process
6.4.   Testing of Cement
    6.4.1.   Fineness

6.4.2. Soundness
6.4.3. Tensile strength
6.4.4. Compressive strength
6.4.5. Rough and ready method of examining cement (Field Test)
6.5. Properties of Cement Mortar, its types & uses
6.5.1. Cement plaster
6.5.2. Cement paints
6.6. Storage of Cement
6.7. Lab and field test

7. Concrete   (12 hours)
7.1. Introduction
7.2. Constituents and mixing ratios
7.3. Properties of concrete
7.3.1 Plastic stage
7.3.2. Hardened stage
7.4. Operations of Concrete
7.4.1. Concrete Mixing – Hand mixing, Machine Mixing/Batch Mixture
7.4.2. Transportation and Placing of concrete
7.4.3. Compaction of Concrete
7.4.4. Curing of Concrete
7.5. Types of Concrete
7.5.1.   Reinforced Cement Concrete: Properties, advantages and disadvantages, causes of failure of RCC, materials used in RCC, corrosion of steel in concrete, quality control of concrete
7.6. Concrete Admixtures
7.7. Lab Testing of Concrete
7.7.1. Tensile Strength
7.7.2. Compressive Strength

Field Works: Visit to ongoing project site and market survey of different building materials

Tutorials
There shall be various exercises, assignments, lab reports, site visit reports and market survey reports Any one of the following site visits can be conducted
1. Quarry Site Visit
2. Brick Factory Visit
3. Cement Factory Visit

Reference
1.   Gurucharan, "Building Materials"
2.   Sushil Kumar, "Building Materials"
3.   S. K. Duggal, New Age Publishers (1 Jan.2019)
4.   S. S. Bhavikatti, Vikas Publishing House (1 Jan.2012)

5.   Course Manual – Building Material I. Prepared by Mrs..Dan Heera Kansakar, Department of Architecture, IOE Pulchowk Campus.

ARCHITECTURAL GRAPHICS I
AR 104

Lecture : 2   **Year : I**
Tutorial : 0   **Part : I**
Practical : 5

Course Objectives:
To provide students a sound knowledge of Architectural graphics with the use of graphical instruments and introduce drawings by the exercises through the concepts and principles of orthographic, parallel and perspective projection to develop architectural graphic techniques to apply them for relevant topics. Also to introduce the fundamental of architectural techniques in architectural graphics and understanding as a means of visual communication.

1   Preliminary Graphics Skill   **(6 hours)**

    1.1   Introduction of drawing and its classification
    1.2   Drafting equipment and their uses
    1.3   Line exercises
          1.3.1   Hatching lines
          1.3.2   Line pattern
          1.3.3   Formation of line
    1.4   Conventional building drawing symbols
    1.5   Technical lettering and its types
    1.6   Scale and dimensioning, its types and system
    1.7   Geometry – Introduction
          1.7.1   Geometrical construction: Geometrical exercises on lines, triangles, polygons and necessary geometric constructions, etc.

2   Theory of Projection   **(4 hours)**

    2.1   Introduction and types of projection
          2.1.1   Parallel and conical projection
                  2.1.1.1   Axonometric projection
                  2.1.1.2   Oblique projection
                  2.1.1.3   Isometric projection
                  2.1.1.4   Orthographic projection
                  2.1.1.5   Perspective projection

3 Orthographic projection (2D Drawings) (4 hours)

3.1 Introduction
3.2 System of 3 planes
3.3 Principle of orthographic projection
3.4 Projection of points, line and plane in different reference planes
    3.4.1 First angle projection
    3.4.2 Third angle projection

4 Isometric projection (1 hours)

4.1 Isometric scale
4.2 Isometric axes
    4.2.1 Non Isometric axes
    4.2.2 Isometric lines and planes

5 Conversion of 3D into 2D and from 2D into 3D (1 hours)

5.1 Conversion of isometric views into orthographic drawings
5.2 Conversion of orthographic view into isometric drawings

6 **Other graphical views, sections and intersection of surfaces** (4 hours)

6.1 Sectional views and its types
6.2 Conic section and engineering curves
6.3 Section of solids
6.4 Intersection of Surfaces and interpenetration and its methods of projection
6.5 Development of Surfaces and its methods of projection.
6.6 Miscellaneous graphical drawings

7 Building drawings (2 hours)

7.1 Building anatomy and its terminologies
7.2 Staircase section
7.3 Wall section
7.4 Door window details
7.5 Types of roof

8   Perspective projection   **(8 hours)**

   8.1   Introduction, perspective terms
   8.2   Types of perspective: One point, two point and three point
   8.3   Views of perspective projection: Normal eye view, worm's eye view and
          bird's eye view
   8.4   Principles of perspective views, its importance and use
   8.5   Difference between perspective and isometric views
   8.6   Different exercises in perspective projection from geometrical and
          architectural drawings
   8.7   Application of perspective projection in architectural drawings

Practical   **(75 hours)**

   1.   Name plate with border line
   2.   Line Exercises: Hatching lines, Line pattern, Formation of lines
   3.   Conventional Building Drawing symbols: Convection for lines, materials
          and textures.
   4.   Technical Lettering and its types: Different types of lettering on proportional
          base.
   5.   Scale and Dimensioning, its types and system: Exercises on different
          scales and system of dimensions of geometrical figures
   6.   Geometric Construction: Exercises on geometrical construction of point,
          line bisection, perpendicular line, parallel line, trisection of line, bisection
          and trisection of angle etc.
   7.   Exercises on inscribing and describing of circle about a triangle, square
          and polygon etc.
   8.   Exercises on construction of square, different types of polygons, external
          and internal tangents, arc tangents, special curves, conical sections and
          other geometrical constructions if needed.
   9.   Theory of Projection: Parallel and conical projection with sketches of
          axonometric projection, oblique projection, isometric projection,
          orthographic projection, perspective projection etc (tree chart).
   10.   Orthographic projection: Exercises on orthographic and pictorial planes in
          1st and 3rd angle projection.
   11.   Projection of points, line and plane in different reference planes
   12.   Exercises on orthographic and pictorial projection of solid figures.
   13.   Exercises on orthographic projection of point and lines on the surface of
          solid figures.
   14.   Exercises on orthographic projection of three dimensional figures in 1st
          and 3rd angle projection. (Conversion of isometric drawing into
          orthographic projection: Soap model)
   15.   Exercises on Isometric Projection:
          - Conversion of isometric views into orthographic drawings.
          - Conversion of orthographic view into isometric drawings.
   16.   Other graphical views, sections and intersection of surfaces:

17. Exercises on auxiliary types of view.
18. Exercises on sectional type of view.
19. Exercises on orthographic projection of different types of section of Geometric solids.
20. Exercise on orthographic projection of intersection or interpenetration of different solids (prism by prism, cylinder by cylinder, cone by cylinder, cone by prism and others if needed).
21. Exercises on development of surfaces of different solids. (Cube, prism, cylinder, cone, pyramid, sphere and other if needed.)
22. Building Drawings: exercise of building drawing of one and half storied building with staircase
    - Floor plans, elevations sections and detailing
    - Staircase detail Section, Wall Section, Door Window Details and Types of Roof etc.
    - 3D (Isometric) views of one storied building
23. Perspective Drawings
24. Introductory Perspective View: one point, two point (Exterior and Interior views)
25. Combined two blocks perspective
26. Combined three blocks perspective
27. Perspective view of one room building
28. Interior perspective view of a room
29. Further exercises on exterior buildings
30. Miscellaneous graphical drawings

Reference
1. D.K.Ching, "Architectural Graphics"
2. R.K. Dhawan "A Text Book of Engineering Drawing"
3. K. Venugopal "Engineering Drawing & Graphics"
4. N.D. Bhatt & V.M. Panchal, "Engineering Drawing (Plane & Solid Geometry)"
5. Warren J. Luzadder and Jon M. Duff, "Fundamentals of Engineering Drawing"
6. F.E. Giescke, A. Mitchell, and others, "Technical Drawing"
7. T.E. French, C.J. Vierck and R.J. Foster, "Engineering Drawing Graphic Technology"

FREE HAND SKETCHING I
AR 105

Lecture	: 2		**Year : I**
Tutorial	: 0		**Part : I**
Practical	: 3		

Course Objectives:

To develop the ability to draw free hand lines, basic shapes and different forms using pencil, pencil color, introduce color theory and its application, and draw different compositions with rendering using pencil, pencil color.

1   Introduction   (4 hours)

1.1   Introduction of History of Art and sketching (Drawing) with preference to Architecture.

1.2   Relevance of Free Hand Sketching in Architecture design

1.3   General knowledge of sketching materials such as pencil, ink pen, pencil colour, water colour, brush, paper, etc.

1.4   Basic Principal of Art and Sketching - Formal, Informal balance, Rhythm, Harmony, contrast, gradation, etc.

1.5   Demonstration of Light, Shade and Shadow in Sketching

1.6   Introduction of Free Hand Perspective view – one point, two point, etc.

2   Elements   (6 hours)

2.1   Introduction of Point, line, plane, solid, form, etc.

2.2   Colour theory and its application – colour wheel, scheme, etc.

2.3   Basic free hand exercise of Pencil, Pencil colour in line (Horizontal, Vertical, Inclined, Curve, Dash, Zigzag, etc)

2.4   Basic free hand exercise of Pencil, Pencil colour in tone (Light, middle, dark)

2.5   Free Hand exercise of different simple geometrical 2D forms – Circle, Square, Rectangular, Triangle, etc.

2.6   Free Hand exercise of Individual 3D forms - Sphere, Cube, Cuboids, Pyramid, Cone, Cylinder, Prism, etc

3   Free Hand practice of Basic Composition & Rendering   (6 hours)

3.1   Rendering exercise with light, shade and shadow in Sphere, Cube, Cuboids, Pyramid, etc.

3.2   Composition of simple geometrical 2D forms – Triangle, Circle, Square, etc.

3.3   Composition of simple geometrical 3D forms – Cube, Sphere, Cuboids, etc.

4   **Free Hand Practice of Still Life in Studio**   **(8 hours)**

   4.1   Free Hand exercise – Simple natural objects (Fruits, vegetables, flower, etc.).
   4.2   Free Hand exercise – Simple manmade objects (Cup, plate, book, box, etc.)

5   **Free Hand Fast Sketching**   **(6 hours)**

   5.1   Fast sketching in perspective by using pencil and pencil colour – Trees, human figures, vehicles, furniture, etc.
   5.2   General practice of Free Hand Perspective view – one point, two point, etc.

Practical   **(45 hours)**

   1.   Free Hand exercise of different lines and tone.
   2.   Simple geometrical 2D forms – Circle, Square, Rectangular, Triangle, etc. by using pencil.
   3.   Free Hand exercise of different simple geometrical 3D forms – Sphere, Cube, Cuboids, Pyramid, Cone, Cylinder, Prism, etc. by using pencil and pencil colour
   4.   Draw Nature still life objects with lines and tones by using pencil and pencil colour
   5.   Draw Manmade still life objects with lines and tones by using pencil and pencil colour.
   6.   Fast Sketching of Trees, Human Figures, Furnitures and vehicles by using pencil and pencil colour.
   7.   Exercise on types of Perspective views (1 point and 2 point) by using pencil.

Reference

   1.   Easy to Draw – Still life, Adarsh Enterprises, New Delhi, India
   2.   Easy to Draw – Landscapes, Adarsh Enterprises, New Delhi, India
   3.   The essentials of Drawing – Peter Gray, Arcturus Publishing, London, UK
   4.   Ching, Francis: Architecture: Form, Space and order
   5.   Deasy, C.M: Designing places for people.
   6.   Quick and clever Drawing – Michael Sanders, David & Charles, UK
   7.   Country Landscapes, Terry Harrison, Search Press, Kent, UK
   8.   Perspective, Milind Mulick, Jyotsna Prakashan, Pune, India

MATHEMATICS FOR ARCHITECTURE I
SH 104

Lecture   **: 3**   **Year : I**
Tutorial   **: 2**   **Part : I**
Practical   **: 0**

Course Objectives:
To equip students with a sound understanding of calculus and geometry enabling them to effectively apply these principles in their respective fields.

1   Two Dimensional Geometry   **(6 hours)**

    1.1   Review of two dimensional loci: straight lines, circle, tangent and normal, parabola
    1.2   Ellipse and hyperbola: Standard forms, tangent and normal
    1.3   Polar curves and their sketching

2   Derivatives and its Applications   **(8 hours)**

    2.1   Review of differentiation techniques, higher order derivatives
    2.2   Indeterminate forms: L' Hospital's rule
    2.3   Application: Rate measure, maxima and minima
    2.4   Asymptote and curvature for Cartesian curves

3   Antiderivatives and its Applications   **(10 hours)**

    3.1   Review of integration techniques
    3.2   Indefinite and definite integration
    3.3   Improper integrals, beta and gamma function and their applications
    3.4   Arc length, area, surface of revolution and volume
    3.5   Applications: Hydrostatic force and pressure, moment and center of mass of lamina with constant density

4   Three Dimensional Geometry   **(7 hours)**

    4.1   Review of coordinates, distance formula, direction ratios and cosines, planes
    4.2   Equation of straight lines in general and symmetrical forms
    4.3   Sphere
    4.4   Right circular cylinder and right circular cone

5   Partial Differentiations and its Applications   (6 hours)

   5.1   Partial derivatives, homogeneous functions, Euler's theorem and total derivatives

   5.2   Extreme values of function of two and three variables, Lagrange's multipliers

   5.3   Applications in optimization of function of two variables in one constraint

6   Multiple Integrals and its Applications   (8 hours)

   6.1   Double integrals in Cartesian and polar form, change of order of integration

   6.2   Introduction of Cartesian, cylindrical and spherical coordinates

   6.3   Area and volume by double and triple integrals

   6.4   Applications: Moments and center of mass of lamina with variable density, moment of inertia.

Tutorials

There shall be related tutorials exercised in class and given as regular homework exercise. Tutorial can be as following for each specified chapters

1.   Two Dimensional Geometry
2.   Derivatives and its applications
3.   Antiderivatives and its applications
4.   Three dimensional Geometry
5.   Partial Differentiation and its applications
6.   Multiple integrals

Reference

1.   Kreyszig, E. (1993), Advance Engineering Mathematics,(7th ed.), John Willey & Sons.
2.   Thomas, T. & Finny, R.(1984), Calculus and Analytic Geometry (6th ed.), Addison-Wesley.
3.   Stewart, J. (2015), Calculus: Early Transcendental, (8th ed.), Cengage Learning
4.   Singh, M.B. & Bajracharya, B.C.(1995), Differential Calculus, (1st ed.) Sukunda Pustak Bhandar, Nepal
5.   Sthapit, Y.R., & Bajracharya, B.C. (2008), A Textbook of Three Dimensional Geometry,(1st ed.), Sukunda Pustak, Bhandar, Nepal
6.   Panta, G.D. & Shrestha, G.S.(1994), Integral Calculus and Differential Calculus,(1st ed.), Sunila Prakashan , Nepal