



BANGLADESH TECHNICAL EDUCATION BOARD
Agargaon, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

ARCHITECTURE TECHNOLOGY

TECHNOLOGY CODE: **661**

5th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

ARCHITECTURE TECHNOLOGY (661)

5th SEMESTER

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	66151	Architectural Design -4	1	6	3	20	30	50	50	150
2	66152	History of Architecture -2	3	0	3	60	90	0	0	150
3	66153	Interior Design	1	6	3	20	30	50	50	150
4	66154	Presentation & Visual Technique	0	6	2	0	0	50	50	100
5	66441	Structural Mechanics	2	3	3	40	60	25	25	150
6	66457	Water Supply & Sanitary Engineering	3	3	4	60	90	25	25	200
7	65851	Accounting Theory & Practice	2	3	3	40	60	50	0	150
Total			12	27	21	240	360	250	200	1050

AIMS**To be able to-**

- Understand the general effects of the built environment in designing different types of building.
- Understand the planning of an educational building.
- Prepare a design of an educational building.
- Understand the planning of a health care service.
- Prepare a design of a health care service.

SHORT DESCRIPTION

General concepts of hospitals, types of Hospitals, patient room facilities, medical equipment, lighting facilities, admitting department, special problem of construction, form, relation between department, fire safety, means of escape, Educational Background and School Organization; Structure of Education; Feasibility of a site to design a school; recreation facility Layout; Safety & Security; Class room Design; Library; Main Stair and Fire Escape; Drive Way; Slopped Way/Ramp, lift, Parking, Common toilet.

DETAIL DESCRIPTION**Theory:****1. Understand the general conception of Hospitals.**

- 1.1 State the Hospital and Health care service.
- 1.2 Define different types of hospital.
- 1.3 List the points for discussion about Hospitals.
- 1.4 Analyze the need of exist Health codes and basic building code requirement.
- 1.5 Describe the effect of project location and feasibility by limitation of existing building.

2. Understand the patient Rooms.

- 2.1 State the general conception of patient room.
- 2.2 Determine the size of the patient room.
- 2.3 Describe the closets, Furniture & its size for a patient room.
- 2.4 Explain the Doors & windows of the patient room.
- 2.5 Describe built in Equipment, medical equipment and space allocation for a patient room.
- 2.6 Describe the Lighting facilities, electrical requirements & Medical cases for patient room

3. Understand the Admitting Department of Hospital.

- 3.1 State the sequence of the functional flow-chart of Admitting Department/IPD/OPD.
- 3.2 Describe the Legend for central admitting department with adjacent medical record department for a 100-Bed Hospital.
- 3.3 State the Hospital policies.
- 3.4 State the relationship between different departments of hospital.
- 3.5 Discuss different components of a hospital such as OT, ICU, HDU, CCU, Post operating room, waste management, kitchen/pantry etc.
- 3.6 Describe the special problems of Design and Construction of a Hospital.
- 3.7 Discuss the External factors such as air-conditioning, fire safety, means of escape and their location, parking, stair, lift, ramp.

4. Understand the planning consideration of a school building

- 4.1 State structure of Education in Asia.
- 4.2 Discuss types of school Organization.
- 4.3 Define the following terms – Central and/or regional school, Community school, Daycare, Elementary school, International school, Junior high school, Kindergarten, Middle school, Neighborhood school, Nursery, Primary, School without walls, Secondary, Senior high, Special & Urban Schools, Junior High School, High School.
- 4.4 Discuss the pupil capacity of school.
- 4.5 Explain the working space relationships.

5. Understand Site Design and the safety & security of school.

- 5.1 State the site selection criteria of school.
- 5.2 State the space allocation & relationships.
- 5.3 Discuss the circulation of vehicular service with fig. of parking system.
- 5.4 Describe the recreational facility layout, materials & drainage facility for school.
- 5.5 Discuss the building lay-out of school for safety and security.
- 5.6 State landscaping and lighting consideration of school.
- 5.7 Describe the accessibility provision such as school exits, stair ways, corridors, doors and school entry, toilet facilities with standard data.

6. Understand the Function of Economy, Content and Class Rooms Design for Secondary School.

- 6.1 State the statement of use by owner.
- 6.2 State the basic concepts of teaching/administration.
- 6.3 Discuss plan and orientation for function of economy.
- 6.4 Discuss the class room planning.
- 6.5 Explain the general requirements for all class rooms such as – electrical and data access, air-conditioning and ventilation, lighting, projection equipment.
- 6.6 Explain the doors, acoustic and visual control of a class room.
- 6.7 Explain the furniture for a class room and mention the factors that are considering for the reader accommodations.
- 6.8 Discuss the auditorium for a school.

7. Understand parking lots and garages.

- 7.1 Describe the factors to determine a drive way and turning radius.
- 7.2 Describe straight and curve driveway and its formulae.
- 7.3 Describe curved device ways and determine its factors.
- 7.4 Describe double drive ways, drive way exit.
- 7.5 Describe the vehicle length & width.
- 7.6 Discuss the slope of ramp, ramp break over angle, angle of departure and angle of approach.

PRACTICAL

1. Site visit, case study & prepare a report for presentation.

- 1.1 Visit any district school/SOS-SHISUPALLI.
- 1.2 Take photographs of ancient and modern school building of that district.
- 1.3 Analysis the orientation of the school building and the toilet facilities.
- 1.4 Investigate the present needs of that school.
- 1.5 Present the report with photograph.

2. Prepare the flow chart of a Healthcare.

- 2.1 Draw a flow diagram of 100-Bed district level Hospital.
- 2.2 Draw a flow diagram of administration department.
- 2.3 Draw a flow diagram of emergency department & diagnostic facilities.
- 2.4 Draw a flow diagram of obstetrical and out-patient department.
- 2.5 Draw a flow diagram of service facilities and laundry department.

3. Design the patient room.

- 3.1 Draw an isolated single patient room (1:50 or $\frac{1}{4}''=1'-0''$).
- 3.2 Draw a semi private patient room (1:50 or $\frac{1}{4}''=1'-0''$).
- 3.3 Draw the section of the patient rooms (2.1, 2.2) (1:50 or $\frac{1}{4}''=1'-0''$).
- 3.4 Draw sub acute care patient wardrobe elevation with dimension.
- 3.5 Draw sub acute care patient rooms head wall elevation with dimension.

4. Design the living area of a hospital.

- 4.1 Draw a plan of assisted living apartment (1:50 or $\frac{1}{4}''=1'-0''$).
- 4.2 Draw a section of assisted living apartment kitchen (1:50 or $\frac{1}{4}''=1'-0''$).
- 4.3 Draw a plan of a six bed ward with furniture (1:50 or $\frac{1}{4}''=1'-0''$).
- 4.4 Draw the plan of reception area.

5. Prepare the Preliminary Design of a Hospital.

- 5.1 Draw the line sketch plan of a 100-Bed district level Hospital.
- 5.2 Draw the plan of 100-Bed district level Hospital in 1:100 or $\frac{1}{8}''=1'-0''$.
- 5.3 Draw the landscape plan of the hospital.
- 5.4 Draw the elevation & section of the Hospital.
- 5.5 Draw the detail car parking area.

6. Case study and submit report of any one of the district/divisional hospital.

- 6.1 Visit any one of the divisional medical college hospital and take photographs.
- 6.2 Draw the layout plan of the visited hospital.
- 6.3 Draw a layout for the future expansion.
- 6.4 Prepare a written report with suggestion for the visited hospital.

7. Prepare the design & drawing of a school.

- 7.1 Draw the flow diagram showing different area used in school.
- 7.2 Sketch the line plan & front elevation of a school as per given requirements.
- 7.3 Develop the floor plan according to the scale.
- 7.4 Draw the front & side elevation according to scale.
- 7.5 Draw a section through the stair and part section through entrance & verandah.

8. Prepare the detail plan of class room & teachers' room.

- 8.1 Draw seating arrangement of a classroom with clear dimension.
- 8.2 Design and draw seating furniture for classroom with dimension.
- 8.3 Draw a wall cabinet for the classroom.
- 8.4 Draw the head master's room with furniture arrangement.
- 8.5 Draw the teachers' room with furniture arrangement.
- 8.6 Draw the common & individual toilet detail of the school with section.

9. Prepare extra purpose building design.

- 9.1 Draw a plan of an auditorium.
- 9.2 Draw the furniture layout in the auditorium with clear dimension.

9.3 Draw a plan of a library for the school with furniture arrangement.

9.4 Detail drawing of a bookshelf & a reading table of the library.

REFERENCE BOOKS

1. Planning: The Architects Hand Book, by E and O. E, S. Row Land PIERCE, PATRICK CUTBUSH & ANTHONY WILLSAMS
2. TIME SAVER STANDARD; BUILDING TYPE, by JOSEPH DE CHIARRA
3. School Building Design Asia ,UNESCO
4. Ernst Neufert ARCHITECT'S DATA, by: Vincent Jhones, George Atkinson OBEBA (Arch) RIBA.

AIMS

- To be able to acquire knowledge of the history of architecture
- To be able to develop knowledge of gothic and renaissance architecture in Europe
- To be able to develop the knowledge of beginning of Islamic architecture in India and be able to know the development of Islamic architecture during Mughal period.
- To be able to understand the contribution of architects for the development of architecture.
- To be able to understand the modern architecture in the world.

SHORT DESCRIPTION

Gothic architecture in France; Renaissance architecture in Europe, Indo-Islamic architecture; Development of imperial style; Development of Islamic architecture during Mughal period; Islamic architecture in Bengal; Islamic architecture in Dhaka; Hindu architecture in East Bengal; Modern architecture in Dhaka; Ancient architecture in Bengal; works of important architects; Islamic architecture in ancient period; Masjid architecture; Islamic architecture in Europe.

DETAIL DESCRIPTION**Theory:****1. Understand the development of gothic architecture in France.**

- 1.1. Describe the historical influences of the gothic style in France.
- 1.2. Identify the architectural characteristics of gothic style in France.
- 1.3. Distinguish between cathedral & churches.
- 1.4. Describe the architectural character of Notre-dame cathedral in Paris.

2. Understand the architectural development of renaissance in Italy.

- 2.1 Describe the historical influence on the renaissance architecture in Italy.
- 2.2 Identify the architectural features of St. Peter in Rome.
- 2.3 Identify the architectural features of S. Paul Cathedral in London.
- 2.4 Describe the architectural character of Milan cathedral in Italy.
- 2.5 Describe the architectural character of Florence cathedral in Italy.

3. Understand the development of imperial style.

- 3.1 Identify different phases of the imperial style.
- 3.2 Describe the early development of Qutub complex.
- 3.3 Describe the architectural character of Qutub Minar.
- 3.4 Identify the change of Qutub complex under the Khilji dynasty.
- 3.5 Describe the architectural features of Alai-Darwaja.

4. Understand the development of the Islamic architecture during the Mughul period.

- 4.1 Describe the historical influence in the development of Mughul style.
- 4.2 Describe the development in the planning of Fatehpur Sikri.
- 4.3 Explain the architectural feature of the Buland Darwaja.

- 4.4 Explain the architectural development in the planning of Red fort.
- 4.5 Explain the architectural development in the planning of Agra fort.
- 4.6 Identify the architectural feature of the Delhi-Jame Masjid.

5. Understand the development of the Tomb architecture during the Mughal period.

- 5.1 Describe the historical influence in the development of Tomb architecture.
- 5.2 Describe the architectural feature of Humayan's tomb.
- 5.3 Explain the architectural feature of the Salim Chisti's tomb.
- 5.4 Describe the architectural features of the Tajmahal.

6. Understand the development of the Indo-Islamic architecture.

- 6.1 Describe the historical influence on the Indo-Islamic architectural style.
- 6.2 Identify the architectural feature of the Bagha Masjid at Rajshahi.
- 6.3 Identify the architectural feature of the Kusomba Masjid at Naogaon.
- 6.4 Visit & Describe the architectural feature of the Tara Masjid at Dhaka.
- 6.5 Describe the architectural feature of the Atia Masjid at Tangail.

7. Understand the development of Islamic architecture in Bengal.

- 7.1 Describe the historical influence on the Islamic architectural style of Bengal.
- 7.2 Visit & Explain the architectural features of the Adina mosque.
- 7.3 Visit & Explain the architectural features of the Sat Gambuj Masjid, Khulna.
- 7.4 Visit & Explain the architectural features of the Atia Masjid, Tangail.
- 7.5 Visit & Explain the architectural features of the Chota-sona mosque at Chapai Nawabgonj.
- 7.6 Visit & Explain the architectural features of the Kadam Rasul at Nabigonj Narayangonj.
- 7.7 Explain the architectural features of the Dakhil-Darwaja.

8. Understand the Islamic architecture in Dhaka.

- 8.1 Visit & Describe the historical development of the Lal-bag fort.
- 8.2 Visit & Describe the historical development of the Hosheney-dalan.
- 8.3 Visit & Explain the architectural features of the Ahsan Monjil.
- 8.4 Visit & Explain the architectural features of the Karjan Hall.
- 8.5 Visit & Explain the architectural features of the Tara mosque.

9. Understand the Hindu architecture in East Bengal.

- 9.1 Visit & Describe the historical development of Kantojir mondir at Dinajpur.
- 9.2 Visit & Describe the historical development of Sotoro- Ratno Mondir at Comilla.
- 9.3 Visit & Describe the historical development of Dhakeyshorey Mondir at Dhaka.
- 9.4 Visit & Describe the historical development of the Joykali Mondir at Dhaka.

10. Understand the development of ancient architecture in Bengal.

- 10.1 Visit & Describe the historical influences of Sonargaon at Narayangonj.
- 10.2 Visit & Describe the historical influences of Maynamoti at Comilla.
- 10.3 Visit & Describe the historical influences of Paharpur at Naogaon.
- 10.4 Visit & Describe the architectural character of Uttara Gano Bhoban at Nator
- 10.5 Visit & Describe the historical influences of Mohastan Gor at Bogra.

11. Understand the development of Islamic architecture & Masjid architecture in Middle East.

- 11.1 Describe the introduction of Muslim architecture in pre- stage.
- 11.2 Explain the architectural characteristics of Muslim architecture.
- 11.3 Explain the historical development of Masjid architecture.
- 11.4 Explain the typical part of a Masjid.

- 11.5 Describe the historical influences & construction technique of Musjidun-Nabobi at Modina.
- 11.6 Describe the historical development of Cordova Jame-Masjid at Spain.
- 11.7 Describe the architectural characteristics of Holy KABA Sharif complex.

REFERENCE BOOKS

- 1. History Of Architecture - by Fletcher.
- 2. Indian Architecture(Islamic Period) - by Percy brown
- 3. Contemporary Architecture Bangladesh. - by institute of architects Bangladesh
- ৪. বাংলাদেশের প্রাচীন কীর্তি (২য় খন্ড মুসলিম যুগ) - আ. কা. মো. যাকারিয়া
- ৫. মসজিদের ইতিহাস - ড. সৈয়দ মাহমুদুল হাসান

AIMS

To provide the students with an opportunity to acquire knowledge, skill and attitude in the area of interior design with special emphasis on:

- Architecture & interior design and its elements.
- Principle, basic styles and rules of interior design.
- Interior space in current practice.
- The role of ceiling, floor covering and wall paneling or cladding.
- The basics of design composition, Interior materials & the elements of Interior design.

SHORT DESCRIPTION

Architecture & history of interior design; Principle, Basic Style & Rules of Interior Design; Basic of Design composition; Interior materials & elements of interior design; Interior space; Natural ventilation & air conditioning.

DETAIL DESCRIPTION**Theory****1. Understand the architecture & history of interior design.**

- 1.1 State interior decoration as a profession.
- 1.2 State emergence of professional interior designer.
- 1.3 Planning Describe the concept of function & planning.
- 1.4 State basic Interior decorating Style & Rules.
- 1.5 Describe human dimension with different Furniture.
- 1.6 Describe basic Furniture dimension for residence difference Space
- 1.7 Explain the contemporary architecture & modern interior design features.
- 1.8 Explain the environmental behavior in relation to the design.

2. Understand the basics of Design composition, Interior materials & elements of interior design.

- 2.1 Explain the elements (line, form, texture, color, pattern, light) and the principles (balance, emphasis, rhythm, proportion, unity or harmony).
- 2.2 Explain different types of Materials (different types of Wood, Board, plywood, Timber, ACP, PVC, Glass, Wall paper, Grass, Paints, Gypsum & Others artificial interior materials etc).
- 2.3 Explain Paints and related products, ferrous and non ferrous metals, gypsum and related products, Adhesives (or glues).
- 2.4 Describe the role of furniture in interior design.
- 2.5 Describe the principles of furniture arrangement.
- 2.6 List the principal textiles and textile terms used in interior decoration.

3. Understand the interior space area in current practice.

- 3.1 Discuss about different types of Ceiling with ceiling materials in different residential interior space.
- 3.2 Discuss about different types of Wall Paneling & Partition area with materials in different residential interior space.
- 3.3 Discuss about different types of Floor with materials in different residential interior space.
- 3.4 Discuss about different types of Decorative Display area with materials in different residential interior space.

- 3.5 Discuss about different types of Blinds & Screen area with materials in different residential interior space.
- 3.6 Discuss the importance of Decorative Plantation and Landscaping in different residential interior space.

4. Understand the natural ventilation & air conditioning.

- 4.1 State guidelines for natural ventilation.
- 4.2 State mechanical ventilation & ventilation with ducts.
- 4.3 Explain recommended fresh air supply.
- 4.4 Explain the size of the openings for natural ventilation.
- 4.5 Discuss the need for air-conditioning & atmospheric conditions for human comfort.

5. Understand the natural lighting & artificial lighting.

- 5.1 State daylight factors.
- 5.2 Describe recommended daylight factors for interiors.
- 5.3 Explain calculation of the openings for natural lighting.
- 5.4 Discuss guidelines for good natural lighting.
- 5.5 Discuss different types of lighting arrangements.
- 5.6 Describe lighting accessories and protection devices.
- 5.7 Discuss guidelines for lighting design and the lumen method of lighting design.

PRACTICAL:

1. Perform the human dimension with different situation.

- 1.1 Sketch the basic human dimensions on standing & seating condition.
- 1.2 Sketch plan & section of a group seating for living space with dimension.
- 1.3 Compare the basic human dimensions (Time saver standards) with local human dimensions (female 5'-1" & Male 5'-6").

2. Perform the drawing of different types of seating

- 2.1 Sketch a general consideration for a seating.
- 2.2 Sketch a general purpose chair for a seating.
- 2.3 Sketch a general considerations office chair for a seating.
- 2.4 Sketch a general considerations Easy chair for a seating.
- 2.5 Sketch different types of seating (Alvar Aalto, ARNE Jacobsen, Shaker Ladder back, Hans wegner, Thonet arm chair).

3. Perform the drawing of different types of house hold furniture.

- 3.1 Draw the plan of sofa set with dimensions.
- 3.2 Draw showcase with dimensions.
- 3.3 Draw plan & elevation of different types of bed with dimensions.
- 3.4 Draw plan & elevation of different types of book-self with dimensions.
- 3.5 Sketch plan & elevation of different types of dining table with dimensions.

4. Perform the sketch of molding & fasteners.

- 4.1 Sketch different types of molding.
- 4.2 Sketch different types of nails with dimensions.
- 4.3 Sketch different types of screw head with their dimensions.
- 4.4 Sketch different types of hardware & fasteners.

5. Prepare the drawing & detail of false ceiling.

- 5.1 Draw a reflected ceiling plan of a hall room.
- 5.2 Draw the section of a false ceiling.
- 5.3 Draw the detail section of a false ceiling showing fixing arrangements of different types of materials.
- 5.4 Make a presentation sheet with different type of false ceiling materials.
- 5.5 Make a presentation or collage sheet with different types of collected false ceiling picture.

6. Prepare the working drawing & detail of different interior room with different wall paneling, display showpiece rack and interior landscaping or plantation.

- 6.1 Make a presentation sheet with different type of collected interior wall paneling picture or image.
- 6.2 Make a presentation or collage sheet with different types of collected display showpiece rack's picture or image.
- 6.3 Make a presentation or collage sheet with different types of collected landscaping or plantation's picture or image.
- 6.4 Draw a plan, elevation & section with detail of a TV display with showpiece rack.
- 6.5 Draw a plan, elevation & section with detail of a wall paneling or partition wall.
- 6.6 Draw an interior landscape or plantation arrangement plan and section of a living room.

7. Prepare a presentation sheet with different interior room lighting shade and lighting arrangement.

- 7.1 Sketch different types of table lamps.
- 7.2 Make a decorative light shade with different wastages materials.
- 7.3 Draw an electrical conduit & fixture layout of a residential plan.
- 7.4 Make a collage by different lighting photo.

8. Prepare the interior of a Kitchen.

- 8.1 Draw a kitchen layout.
- 8.2 Sketch different types of kitchen equipment with measurements.
- 8.3 Draw the detail plan of the kitchen with cabinet.
- 8.4 Draw the section of the kitchen cabinet.
- 8.5 Draw an isometric view of the kitchen room.

9. Prepare the interior model of a residence as an Interior Project.

- 9.1 Draw furniture layout plan of different rooms of a residence.
- 9.2 Make a detail interior model of the residence.

Ref.:

- 1. Interior design principles and practice - by -M. Pratop Rao.
- 2. Interior design: An introduction to architectural Interiors. - by-Arnold Friedmann.
- John F. Pile , Forrest Wilson.
- 3. Elements of Interior Design and Decoration. - by-Sherrill Whiton
- 4. Time Saver Standard interior. - by-Jesph D. Chirra.
- 5. Construction drawings and details for interiors. - by- W. Otie Kilmer.
- 6. Interior Design illustrated. - by-Francis D.K. Ching.

AIMS

- To be able to understand the basic concept and purpose of presentation and visualization techniques.
- To be able to communicate Ideas using presentation techniques.
- To be able to prepare a presentation of a project (conservational/historical building).
- To be able to convert the output on illustrator & Photoshop.
- To be able to make a project brochure.

SHORT DESCRIPTION

Basic knowledge of presentation technique; Manual techniques of presentation; Scaling technique for freehand sketch presentation; Exterior and interior Perspective view; Presentation through Photographs; 2D & 3D Presentation by CAD; Presentation by Sketch up; Illustration & Photoshop; a complete Project (Historical or conservational building) presentation.

DETAIL DESCRIPTION**Practical****1. Prepare presentation by free hand sketch.**

- 1.1 Show different freehand drawing of conservational/historical building.
- 1.2 Brief the project (conservational/historical building) in detail for presentation.
- 1.3 Sketch different furniture.
- 1.4 Draw the sketch of a given view (with building).
- 1.5 Render on the sketches (black & white).
- 1.6 Render by using color.

2. Perform scaling of freehand sketch.

- 2.1. Select a suitable object i.e. pencil, sketch etc. for scaling.
- 2.2. Follow the scaling technique.
- 2.3. Sketch the real object/plants/flower vas follow the scaling technique.
- 2.4. Sketch a room corner from where you seated by following the scaling technique.

3. Prepare exterior view of building by 2-point perspective.

- 3.1. Draw 2-point perspective view of a small building.
- 3.2. Render the building with different media.
- 3.3. Draw the shade shadow of the perspective view.
- 3.4. Draw the roads, cars/vehicles, trees, pools etc. in front of the building.
- 3.5. Draw the freehand perspective view of the historical building.

4. Prepare interior view of building by 1-point perspective.

- 4.1. Draw 1-point perspective view of a room.
- 4.2. Draw 1-point perspective view of a kitchen.
- 4.3. Draw 1-point perspective view of a bath/toilet.
- 4.4. Draw a sectional perspective view of a building.

5. Prepare a presentation by photograph.

- 5.1. Take different angle photograph of the historical building.
- 5.2. Take close photo of different building components.

- 5.3. Take a motion (moving car/vehicle etc.) picture.
- 5.4. Take & compare the photo of a face in different angle lighting.
6. **Prepare a set of presentation drawing of the project by using CAD.**
 - 6.1. Visit and survey the area of the historical building.
 - 6.2. Collect the floor plan and draw it on CAD.
 - 6.3. Draw the elevation with rendering.
 - 6.4. Draw the sectional elevation of the building.
7. **Prepare a set of 3D presentation drawing of the historical building/Project.**
 - 7.1. Make sketch of the building from the taken photograph.
 - 7.2. Render the sketch using different rendering media.
 - 7.3. Draw a 3D view.
8. **Prepare a project presentation by using illustrator and Photoshop.**
 - 8.1. Convert and edit a CAD file into illustrator/Photoshop.
 - 8.2. Convert any file into /Photoshop and edit them for print and presentation.
 - 8.3. Make a poster with illustrator/Photoshop.
 - 8.4. Make a banner with illustrator/Photoshop.
 - 8.5. Make a brochure for the project.

REFERENCES:

1. Sketch up tutorial on you tube.
2. Drawing techniques: 7 fundamentals of pencil drawing | Creative Bloq
3. Freehand: Sketching Tips and Tricks Drawn from Art by Helen Birch
<https://www.goodreads.com/book/show/17557503-freehand>
4. Freehand Drawing Will Allow You to Draw Anywhere, and Anything.

AIMS:

- To enable to apply the knowledge of scientific principles to problems of mechanical nature.
- To develop an understanding of mechanical properties of materials.
- To assist in applying mathematical and geometrical calculations to the analysis of statically determinate beams.

SHORT DESCRIPTION

Mechanical properties of material; Laws of forces; Moment; Friction; Centroid and centre of gravity; Moment of inertia; Torsion on circular shaft; Shear force and bending moment.

DETAIL DESCRIPTION**Theory:****1.0 Understand the important aspects of mechanical properties of materials.**

- 1.1 Mention the necessity to know about the mechanical properties of materials.
- 1.2 Define the following terms:
 - a. Stress, tensile stress, compressive stress, shear stress.
 - b. Strain, tensile strain, compressive strain, shear strain,
 - c. Hooke's law, modulus of elasticity and modulus of rigidity.
- 1.3 Explain stress-strain diagram of mild steel and concrete.
- 1.4 Define the following terms:
 - a. Elasticity, proportional limit, yield point, ultimate stress, breaking stress, working stress and factor of safety.
 - b. Strength, stiffness, toughness, ductility, malleability, brittleness, creep, fatigue failure, resilience, modulus of resilience, thermal stress in simple bar and Poisson's ratio.
- 1.5 Compute stress, strain, modulus of elasticity and modulus of rigidity.
- 1.6 Solve problems involving resilience, thermal stress and Poisson's ratio.
- 1.7 Compute stress developed in composite bar under tension and compression.

2. Understand the concept of laws of forces.

- 2.1 Explain the laws of forces.
- 2.2 Define the following terms:

Force, co-planar forces, non-coplanar forces, concurrent forces, non-concurrent forces, co-linear forces, parallel forces, laws of equilibrium of forces.
- 2.3 Mention the parallelogram laws of forces.
- 2.4 State the composition of forces and resolution of force.
- 2.5 Define component of force, rectangular component and resultant of forces.
- 2.6 Compute the resultant force-
 - a. Triangle of forces
 - b. Polygon of forces
 - c. Converse laws of triangle and polygon laws of forces graphically.
- 2.7 Calculate the resultant of forces: co-planar forces, concurrent forces, parallel forces and co-linear forces
- 2.8 Explain Lami's theorem.
- 2.9 Solve problems on Lami's theorem.

3. Understand the aspects of moment of forces.

- 3.1 Define the term moment (analytically and graphically).
- 3.2 Differentiate moment with force.
- 3.3 Explain Varignon's principle of moment.
- 3.4 Distinguish like and unlike parallel forces.
- 3.5 State the meaning of couple.
- 3.6 Mention the properties of couple.
- 3.7 Solve problems on moment of couple and moment of forces.
- 3.8 Solve problems on moment of like and unlike parallel forces.

4. Understand the concept of frictional forces.

- 4.1 State friction, static friction and dynamic friction.
- 4.2 Mention the laws of static friction and dynamic friction.
- 4.3 Explain angle of friction and co-efficient of friction.
- 4.4 Compute friction of a body on horizontal planes.
- 4.5 Compute friction of a body on inclined planes.
- 4.6 Compute frictional force acting on a ladder.

5. Understand the aspects of centroid and centre of gravity.

- 5.1 Define the terms: centroid and centre of gravity.
- 5.2 State the axis of symmetry and parallel axis.
- 5.3 Compute the centroid by the method of moment of the following sections:
 - a. rectangular b. triangular c. circular d. semi-circular
 - e. hollow f. I-shaped g. T-shaped h. L-shaped
- 5.4 Solve problem on centre of gravity of a composite parallelepiped body.

6. Understand the concept of moment of inertia.

- 6.1 State 1st and 2nd moment of area.
- 6.2 Explain the meaning of radius of gyration.
- 6.3 Mention the theorems of moment of inertia.
- 6.4 Compute the moment of inertia of plane area about any axis of the following sections:
 - a. rectangular b. triangular c. circular d. semi-circular
 - e. hollow f. I-shaped g. T-shaped h. L-shaped

7. Understand the aspects of torsion on solid and hollow circular shaft.

- 7.1 State the laws of motions.
- 7.2 Explain the term circular motion.
- 7.3 Define the terms: torsion and torsional stress.
- 7.4 Mention the fundamental assumptions of torsional stress.
- 7.5 Find the relation between torsional stress and strain.
- 7.6 Interpret the formulas relating to finding torque
- 7.7 Solve problems involving torsion.

8. Understand shear force (SF) and bending moment (BM).

- 8.1 Define the term 'beam'.
- 8.2 List different types of beams.
- 8.3 Mention various types of load on beams.
- 8.4 Define shear force and bending moment.
- 8.5 Differentiate between shear force and bending moment.

- 8.6 Mention the sign conventions of shear force and bending moment.
- 8.7 List the characteristics of shear force and bending moment diagram.
- 8.8 Calculate and draw SF and BM diagram of cantilever beams with point load, distributed load and both.
- 8.9 Calculate and draw SF and BM diagram of simply supported beams with point load, distributed load and both.
- 8.10 Calculate and draw SF and BM diagram of simply supported overhanging beam with point load, distributed load and both.

PRACTICAL:

1. Perform compression test of a timber specimen.
2. Conduct tensile test of mild steel rod and draw stress-strain curve with test results.
3. Determine the percentage elongation of mild steel.
4. Determine the centroid of a composite area.
5. Determine the resultant of a force system graphically.
6. Show the resultant of forces by using force board.
7. Prove the Lami's theorem by using force board.
8. Practice to determine the co-efficient of friction of timber, concrete and mild steel.
9. Practice to determine reactions of a beam by using spring balance.

REFERENCE BOOKS:

1. Structural Mechanics - W Morgan and D T Williams
2. Structural Mechanics - Singer / Popov
3. Mechanics of Materials - Philip Gustave Laurson and Williams Junkin Cox
4. Structural Mechanics - A. K. Upadhyay Published by SK Kateria & Sons, India.
5. Applied Mechanics - R.S Khurmi

AIMS

To be able

- to select suitable methods for collection and distribution of water from source to community.
- to identify impurities of water and suitable methods of purification.
- to develop understanding of the procedure of construction, repair and maintenance of water supply systems.
- to compare various methods and techniques used to treat and dispose of sewage and control of water pollution.
- to identify various sewer pipes, fittings, procedures of construction, repair and maintenance of sewage disposal.
- to compare various types of pit latrine.

SHORT DESCRIPTION

Water requirements; Sources of water; Different types of appurtenances used in water supply systems; Collection and transmission of water; Quality of water; Treatment of water (clarification) filtration, disinfection, softening; Water distribution; Constructions and maintenance of distribution system; Water reservoir; Rural water supply system; Water pollution and its effects on the environment; Sewage general consideration; Sewer pipe; Sewer appurtenance; Flow in sewer; Construction and maintenance of sewer; Characteristics of sewage; Sewage Sludge treatment and disposal; Rural sanitation; Health and hygiene;

DETAIL DESCRIPTION**1. Understand the various aspects of consumption of water.**

- 1.1 Describe population prediction and various methods of population forecast.
- 1.2 Describe the various needs for clean water and list the quantities required for those purposes.
- 1.3 Explain the influence of the factors which affect per capita consumption of water:
 - a. Size of city
 - b. Characteristics of population
 - c. Industries and commercial organization
 - d. Climatic condition
 - e. Metering of water

2. Understand the different sources of water.

- 2.1 Identify different sources of water.
- 2.2 Explain the hydrological cycle.
- 2.3 State the advantages and disadvantages of ground water.
- 2.4 Mention the advantages and disadvantages of surface water.
- 2.5 Distinguish between the ground water supply and surface water supply in respect to quality of water.
- 1.6 Explain rainwater harvesting.

3. Understand the pipe appurtenances.

- 3.1 List some pipe appurtenances
- 3.2 Describe air valves
- 3.3 Describe bib and stop cocks.
- 3.4 Describe fire hydrant
- 3.5 Describe reflux, relief, scour and sluice valves
- 3.6 Describe water meters

4. Understand the collection and transmission system of water.

- 4.1 Identify the different types of intake used in collecting surface water.
- 4.2 Describe the different intake systems with sketches.
- 4.3 Classify the different type of pumps used in water supply.
- 4.4 Explain the uses and limitations of different type of pumps.
- 4.5 Distinguish between turbine pump and submersible pump used in deep tube well.

5 Understand the various types of impurities in water.

- 5.1 State the different type of impurities present in water.
- 5.2 Explain the causes of turbidity, color, taste and odor in water.
- 5.3 Mention the effects and maximum allowable limits(WHO & BSTI) of impurities (pH, colour, Turbidity, TDS, SS, Hardness, chloride, Nitrate, Iron, Sodium, Arsenic, Cadmium, lead, total coliform and faecal coliform) in water.
- 5.4 Explain the causes and effects of alkalinity, acidity and hardness in water.
- 5.5 Describe the effects of gaseous impurities(carbon di-oxide, hydrogen sulphide, dissolved oxygen) in water.

6 Understand the treatment of water by clarification, filtration, disinfection and softening.

- 6.1 Explain a typical flow diagram of treatment plant units.
- 6.2 Outline the need of screening and filtration of water.
- 6.3 Explain latest water filter and filtration process for drinking of water.
- 6.4 Mention the principle of plain sedimentation and sedimentation with coagulation.
- 6.5 State different types of coagulants with their purpose and action.
- 6.6 Describe a typical sketch of sedimentation tank and process of flocculation.
- 6.7 Explain the characteristics between the slow sand and rapid sand filter.
- 6.8 Describe disinfection of water by chlorination and advantages and limitations of disinfection of water by chlorination and by;
 - a. Heating and boiling
 - b. pH control
 - c. Using oxidizing agent
 - d. Ultra violet Ray
 - e. Ozone
- 6.9 Explain the need of softening and list different processes of water softening

7 Understand the different types of water distribution methods, construction and maintenance of water distribution system.

- 7.1 State the different features of the distribution systems.
- 7.2 Describe with the help of sketches the different methods of supply of water.
- 7.3 Outline the advantages and disadvantages of different methods of supply of water.
- 7.4 Describe with sketches the different layout methods of distribution pipes.

- 7.5 Explain the relative advantages and disadvantages of different layout methods of distribution pipes.
- 7.6 Describe the procedure of excavation and back filling for laying pipe lines.
- 7.7 Describe the procedure for-
 - a. handling and laying pipes and their maintenance
 - b. placing and maintenance of hydrants and valves
 - c. cleaning of water mains and use of washout system.

8 Understand different types of reservoir.

- 8.1 Define reservoir.
- 8.2 Mention the different types of reservoir according to position and shape.
- 8.3 Explain the needs of roof tank and water reservoir in a building.
- 8.4 Describe the typical section of roof tank and water reservoir in a building.
- 8.5 Describe the procedure for cleaning of water reservoir.

9 Understand the water supply systems in rural area of Bangladesh.

- 9.1 Give introduction to different types of hand pumps: No. 6 hand pump, deep-set (Tara) pump.
- 9.2 Describe the procedure of drilling, aquifer selection, back filling and installation techniques including developing of new tube well.
- 9.3 Describe operation & maintenance of No. 6 hand pumps and deep-set(Tara) hand pumps.
- 9.4 Describe operation & maintenance of deep tube well.

10 Understand the general consideration of sewerage system.

- 10.1 Define sewage
- 10.2 Explain conservancy system and water carriage system of sewage.
- 10.3 Compare various types of sewerage system.
- 10.4 Outline the advantages and limitations of sewerage system and septic tank.

11 Understand the sewer pipes and techniques of their joint.

- 11.1 Identify various types of sewers of a complete sewerage system.
- 11.2 Compare the advantages and limitations of uses of different kinds of sewer pipes according to construction materials.
- 11.3 Identify the pipes of different materials for different uses.
- 11.4 Describe various kinds of joint in connecting the pipes with the help of sketches.
- 11.5 List the requirements of a good sewer joint.
- 11.6 Describe the process of jointing two pipes of different materials.
- 11.7 Identify methods of limiting the corrosion of sewer pipes.

12. Understand appurtenances and their purposes.

- 12.1 Identify various sewer appurtenances.
- 12.2 Describe various sewer appurtenances with the help of sketches and state their functions.
- 12.3 Discuss the factors to be considered for locating the sewer appurtenances so that their function can be achieved.
- 12.4 Explain the junction chamber and regulator with sketches.
- 12.5 Draw a neat sketch of siphon & inverted siphon and describe their functions.
- 12.6 Describe the necessity of pumping sewage.
- 12.7 Discuss the requirements of sewage pumps and list various types of sewage pumps.
- 12.8 List the points that should be considered in locating the site of pumping station and state the capacity of pump and pumping stations.

13. Understand the principle of construction maintenance of sewers.

- 13.1 Explain general aspects for preparation of sewerage scheme and list various types of sewer.
- 13.2 Describe procedures followed in the construction of sewers and explain the procedure of laying a sewer in a trench.
- 13.3 Explain under what circumstances the sheeting (timbering), bracing and dewatering of trenches are required and what is the process of remove of sheeting (timbering) of trenches.
- 13.4 Specify with sketch, the setting-out of the fall of sewer for the continuous gravitational flow of sewage.
- 13.5 Describe the construction of brick sewer and concrete sewer.
- 13.6 Describe the techniques of testing sewer lines and the precautions should be taken during back filling of trenches.
- 13.7 State different ways of protection for sewer.
- 13.8 Identify the need for maintenance of sewer and identify the precautions to be taken before entering in sewers and identify the factors to be considered for frequent inspection and supervision of sewer so that proper flow is maintained.
- 13.9 List the main problems which are faced in maintenance of sewer and describe the procedures used to clean and unlock sewer.

14. Understand the characteristics of sewage.

- 14.1 Describe the constituents of sewage.
- 14.2 Outline the necessity of examination of sewage.
- 14.3 Describe physical characteristics of sewage and their tests.
- 14.4 Explain the importance of determination of solids in sewage.
- 14.5 Describe various chemical tests of sewage.
- 14.6 Describe the importance of common laboratory in the treatment of sewage.
- 14.7 Describe the role of aerobic and other micro-organism in the decomposition of sewage.
- 14.8 Explain the following terms:
 - a) Anaerobic active in sewage
 - b) Biochemical oxygen demand(BOD)
 - c) Chemical oxygen demand(COD)

15. Understand the methods used for sewage treatment and disposal.

- 15.1 Outline the stages of sewage treatment.
- 15.2 Explain the purpose of preliminary sewage treatment.
- 15.3 Name different kinds of treatment process for removing impurities of each stage of the treatment process.
- 15.4 Describe the schematic layout of a typical sewage treatment plant.
- 15.5 Describe with the help of neat sketch of a sedimentation tank giving the factors, which reduce the efficiency of sedimentation tanks.
- 15.6 List various methods of sewage disposal.
- 15.7 State the characteristics of soil which influence waste water disposal.
- 15.8 Explain the term dilution and its suitability.
- 15.9 Describe septic tank and draw a neat sketch of septic tank and soak well.

16. Understand the rural sanitation practices in Bangladesh.

- 16.1 Pit latrine technology:
 - a) Describe the ventilated improved pit (VIP) latrine and simple pit latrine.
 - b) Draw a neat sketch of VIP latrine and describe the special features of VIP latrine.
 - c) Mention the advantages & disadvantages of VIP and simple pit latrine.

16.2 Pour flush technology:

- a) Describe the single/twin pit pour flush latrine.
- b) Types of single/twin pit pour flush latrine.
- c) Mention the advantages & disadvantages of single/twin pit pour flush latrine.
- d) Compare the advantages and disadvantages of using twin pit latrine over septic tank.

16.3 Construction and maintenance of sanitation facilities:

- a) Describe the construction procedures of VIP, simple pit, single and twin pit pour flush latrine.
- b) Describe the construction procedure of small bore sewer system.

17. Understand health and hygiene.

- 17.1 Describe the common diseases.
- 17.2 Explain the causes of transmission of these diseases.
- 17.3 Describe how to control these diseases.
- 17.4 Explain the importance of hygiene education.
- 17.5 Describe the scope and methodology for hygiene education.
- 17.6 Explain the advantages of social mobilization for hygiene practice.
- 17.7 Explain integrated approach for water, sanitation and health education.

PRACTICAL

1. Make a legend of water supply and sewerage system with related fittings and fixtures.
2. Sketch the pipeline network for rural water supply
3. Draw a neat sketch of a underground water reservoir
4. Sketch different types of plumbing fixtures
5. Identify the common troubles in water supply lines and their solution by visiting concern authorities (WASA, City Corporation, Pourashava and Polytechnic Institute).
6. Conduct physical and chemical tests of water.
 - a. Conduct physical tests of water (pH value & turbidity) using field pH and turbidity meter.
 - b. Conduct chemical tests of water (iron and chloride) using field kits.
 - c. Conduct the arsenic test of water using field kits.
 - d. Conduct hardness test using field kits.
7. Prepare a model of septic tank
8. Prepare a model of soak pit
9. Sketch layout plan of pipe lines for latrine
10. Draw a neat sketch of different components of small bore sewer system
11. Prepare a model of ventilated improved pit (VIP) latrine.
12. Prepare a model double vault compost latrine.
13. Sketch of different types of sewers.

REFERENCE BOOKS

1. Water Supply and Sanitary Engineering [Environmental Engineering] by S. C. Rangwala. Charotar Publishing House, India (2006).
2. Water Supply & Sanitation- Rural and Low Income Urban Communities by M. Feroze Ahmed and Md. Mujibur Rahman. ITN-Bangladesh, BUET, Dhaka, Bangladesh (2000).

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Accounting Theory & Practice

T	P	C
2	3	3

AIMS

- To be able to understand the principles and practices of book keeping and accounting.
- To be able to understand the procedures of general accounting, financial accounting and their applications.
- To be able to understand the concept of income tax , VAT & Public works accounts.

Course Outlines

Concept of book keeping and accounting; Transactions; Entry systems; Accounts; Journal; Ledger; Cash book; Trial balance; Final accounts; Cost account & financial accounting; Income Tax; Public works accounts.

DESCRIPTION;

Theory

1. Concept of book keeping and accounting.

- 1.1 Define book keeping and accountancy.
- 1.2 State the objectives & of book keeping.
- 1.3 State the advantages of book keeping.
- 1.4 Differentiate between book keeping and accounting.
- 1.5 State the necessity and scope of book keeping and accounting.

2. Transactions Analysis.

- 2.1 Define transactions and business transaction.
- 2.2 Describe the characteristics of transaction.
- 2.3 Discuss the classification of transaction.

3. Entry system of Accounting.

- 3.1 State the aspects of transactions.
- 3.2 Define single & double entry system ..
- 3.3 Discuss the principles of double entry system.
- 3.4 Distinguish between single entry and double entry system of book keeping.
- 3.5 Justify whether double entry system is an improvement over the single entry system.

4. Classification of accounts.

- 4.1 Define accounts.
- 4.2 State the objectives of accounts.
- 4.3 Illustrate different type of accounts with example.
- 4.4 Define "Golden rules of Book keeping".
- 4.5 State the rules for "Debit" and "Credit" in each class of accounts.
- 4.6 Define accounting cycle.

5. Journal .

- 5.1 Define Journal.
- 5.2 State the functions of Journal.
- 5.3 Mention the various names of Journal.
- 5.4 Interpret the form of Journal.

6. ledger.

- 6.1 Define ledger.
- 6.2 Interpret the form of ledger.
- 6.3 State the functions of ledger.
- 6.4 Distinguish between Journal and Ledger.
- 6.5 Explain why ledger is called the king of all books of accounts.
- 6.6 Explain the following terms: Balance, Balancing; Debit balance; credit balance.

7. Cash book & Its Classification.

- 7.1 Define cash book.
- 7.2 Classification of cash book.
- 7.3 Explain cash book as both Journal and Ledger.
- 7.4 Define discount.
- 7.5 Explain the different types of discount.

8. Trial balance.

- 8.1 Define trial balance.
- 8.2 State the object of a trial balance.
- 8.3 Discuss the methods of preparation of a trial balance.
- 8.4 Explain the limitations of a trial balance.
- 8.5 Prepare trial balance from given ledger balance. (practical)

9. Final accounts.

- 9.1 State the components of final account.
- 9.2 Distinguish between trial balance and balance sheet.
- 9.3 Select the items to be posted in the trading account, profit & loss account and the balance sheet.
- 9.4 State the adjustment to be made from the given information below or above the trial balance.
- 9.5 Explain the following terms: revenue expenditure; capital expenditure; depreciation; annuity method diminishing balance method, machine hour method

10. Cost and financial accounting.

- 10.1 Define financial accounting.
- 10.2 State the objectives of financial accounting.
- 10.3 Define cost accounting.
- 10.4 State the elements of direct cost and indirect cost.
- 10.5 Discuss the capital budgeting
- 10.6 Explain the following terms:
 - a. Fixed cost b. Variable cost c. Factory cost d. Overhead cost e. Process cost f. Direct cost g. Operating cost h. Standard cost

11. Income Tax

- 11.1 Define Income Tax.
- 11.2 State the objects of Income Tax.
- 11.3 Classification of assesses.
- 11.4. Taxable income of assesses.
- 11.5 Tax rebate.
- 11.6 Explain the following terms: Income tax year; assessment year, NBR.

12. Public works accounts.

- 12.1 State the important aspects of public works accounts.
- 12.2 Describe the main features of public works accounts.
- 12.3 Define Value Added Tax (VAT)
- 12.4 State the merits and demerits of VAT.
- 12.5 Explain the following terms :Revenue ; Grant ; Bill; Voucher.

PRACTICAL

- 1. Identify the transaction from given statements stating reasons.
- 2. Determine Debtor (Dr) and Creditor (Cr.) from given transactions applying golden rules.
- 3. Journalize from given transactions.
- 4. Prepare ledger from given transactions.
- 5. Prepare double column cash book from given transactions showing balances.
- 6. Prepare triple column cash book from given transaction and find out the balances.
- 7. Prepare analytical and imprest system of cash book.
- 8. Prepare trial balance from the given ledger balance.
- 9. Prepare trading account, profit & loss account and balance sheet from the given trial balance & other information.
- 10. Prepare cost sheet showing prime cost, factory cost, cost of production, total cost and selling price.

REFERENCE BOOKS

- 1. Book-keeping & Accounting - Prof. Gazi Abdus Salam
- 2. Principles of Accounting - Hafiz uddin
- 3. Cost Accounting - Prof. Asimuddin Mondol
- ৪. হিসাবরক্ষণ ও হিসাববিজ্ঞান - পরেশ মন্ডল
- ৫. উচ্চ মাধ্যমিক হিসাববিজ্ঞান - হক ও হোসাইন
- ৬. আয়কর - ড. মনজুর মোরশেদ