



BANGLADESH TECHNICAL EDUCATION BOARD
Agargaon, Dhaka-1207

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

ARCHITECTURE & INTERIOR DESIGN
TECHNOLOGY CODE: 687

6th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016
ARCHITECTURE & INTERIOR DESIGN
6th 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	68761	Interior Design -4	2	6	4	40	60	50	50	200
2	68762	Interior Working Drawing -2	1	6	3	20	30	50	50	150
3	66163	Landscape Design	1	3	2	20	30	25	25	100
4	66162	Computer Rendering & Animation -1	0	9	3	0	0	50	50	100
5	66454	Theory of Structure	2	3	3	40	60	25	25	150
6	68764	Air Conducting and Acoustics	2	3	3	40	60	25	25	150
7	65852	Industrial Management	2	0	2	40	60	0	0	100
Total			10	27	19	200	300	225	225	950

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

- Design of an office building.
- Design the interior of an office building.
- Design the arrangement of furniture in an office building.

SHORT DESCRIPTION:

Planning, Design criteria, FAR, Space allowance, Office arrangements, Conference room, Ceiling, floor and RAJUK rules.

THEORY:**1. Understand office building.**

- 1.1 Define office building.
- 1.2 Define necessity of an office building.
- 1.3 Define efficiency and simplicity of an office building.

2. Understand the general rules and regulations of building construction ACT-2008

- 2.1 Describe the FAR analysis of an office building (Type: F).
- 2.2 Describe MGC rules for an office building.
- 2.3 Define the setback rules of an office building site
- 2.4 Describe the user number of an office building according as per building Code.
- 2.5 Describe the utility facilities of an office building.

3. Understand the site analysis of an office building.

- 3.1 Describe the design principle of an office building.
- 3.2 Mention the factor which effects the style of office building.
- 3.3 Describe the site analysis as per climate consideration.
- 3.4 Define the wind flow & sun path diagram.
- 3.5 Describe the SOWT (Strength, Opportunity, Weakness, Threat) & site forces.

4. Understand the location of core area of an office building.

- 4.1 Describe the straight line principle.
- 4.2 Explain the core area.
- 4.3 Describe the factors determining the size & number of elevators.
- 4.4 Describe the services which are provide in a vertical duct.
- 4.5 Describe the main stair and fire escape.
- 4.6 Describe the services (toilet, lavatories, lobby, corridor etc)

5. Understand the parking lots and garages of an office building.

- 5.1 Describe the planning procedure of parking lots and garages.
- 5.2 Describe the traffic pattern of an office building.
- 5.3 Describe the basic grid layout adopted for framing.
- 5.4 Explain the entrance about office building ramp slope.
- 5.5 Describe the ramp slope, break over angle and derive way exit.
- 5.6 Describe angle of approach and angle of departure of a ramp.
- 5.7 Describe the entrance & exit for disable person.

6. Understand the office layout according to function.

- 6.1 Describe the necessity of internal circulation of an office.
- 6.2 Describe the location of reception area and visitor control.
- 6.3 Describe the location of conference room.
- 6.4 Describe the space required for different furniture.
- 6.5 Name six basic office functions (management, Financial, Sales, General, Technical, Production_ office group function).
- 6.6 Describe space allowance i,e office space & file space, special equipment, storage space special room allowance)

7. Understand the office space design.

- 7.1 Define flow diagram.
- 7.2 Define zoning & bubble diagram.
- 7.3 Explain the functional analysis of different office buildings (Bank, Corporate Office, Architectural/Engineering office etc)
- 7.4 Describe the necessity of internal circulation of an office building.

8. Understand the office spaces design use ergonomics.

- 8.1 Define work station area.
- 8.2 Explain the different types of office furniture.
- 8.4 Mention the space allowance of different areas of an office.
- 8.5 Necessary ergonomic data for office space design.

9. Understand the false ceiling of an office.

- 9.1 Define false ceiling of an office building.
- 9.2 Describe different types of false ceiling materials.
- 9.2 Describe different types of false ceiling.
- 9.3 Explain the reflected ceiling plan.
- 9.4 Mention the variation of color and texture of different ceiling materials.

10. Understand the floor of an office.

- 10.1 Explain the clear room height of an office.
- 10.2 Describe different types of floor.
- 10.3 Define the mezzanine floor.
- 10.4 Describe different materials used as floor finish.

10. Understand the wall paneling & partition of an office.

- 10.1 Mention the finish materials used in interior of office.
- 10.2 Describe the variation of texture for using different materials.
- 10.3 Mention the importance of color combination in the interior of an office.
- 10.4 Explain the variation of environment and image for using different color.

Practical:

1. Visit a site for office building and make a sketch plan of the site with road and other facilities.
2. Draw wind flow diagram & sun path diagram of that proposed site.
3. Draw preliminary sketch with flow diagram as per building rules and regulation.
4. Make single line diagram with traffic pattern.
- 5 Draw basement & Ground floor plan showing parking.
6. Draw mezzanine & typical floor plan.
7. Draw two sides elevation.
8. Draw a section through stair/ fair escape.
9. Prepare the individual floor with furniture.
10. Prepare a reflected false ceiling plan of office room with details.
11. Prepare a conference room with furniture (About 20 person)
12. Prepare a reception area with entry & exit.
13. Draw a kitchen try area with details.
14. Prepare a RAZUK sheet for that office building.

REFERENCE BOOK:

1. Time Saver Standards for Building Types (2nd edition)
-Joseph De. Chiara & Join Callender.
2. Time Saver Standards for Interior
-Joseph De. Chiara & Join Callender.
3. Building construction ACT-2008
4. Neufert Architects Data.
5. Bangladesh National Code.

AIMS

- To be able to understand the working drawing of residential building plan procedure.
- To be able to understand the working drawing of residential building furniture drawing procedure.
- To be able to understand the working drawing on kitchen & toilet with fixture & fittings.
- To be able to understand the working drawing of false ceiling, wall partition, cabinet and floor materials.

SHORT DESCRIPTION,

Plan of residential , Furniture lay-out ,Detail of stair , Detail of kitchen, Detail of bathroom, False ceiling and cabinet.

THEORY:**1. Understand the general principle of Furniture.**

- 1.1 List the furniture of residential building.
- 1.2 List the furniture of office its standard dimension.
- 1.3 Describe the type of furniture on the basis of materials.
- 1.4 List the hardware which used in materials of furniture.
- 1.5 State the characteristics of plan board, MDF board, Melamine board, veneer board. P.V.C board.

2. Understand interior of Modern kitchen.

- 2.1 Define the function of kitchen.
- 2.2 Describe the types of modern kitchen.
- 2.3 Describe the list of fixture and fittings of modern kitchen.
- 2.4 Describe the working triangle of kitchen.
- 2.5 Describe the utensil hanging materials.
- 2.6 Selection of kitchen cabinet materials of kitchen.
- 2.7 Describe the various cabinet hardware .
- 2.8 Describe the type of light which is used in modern kitchen.
- 2.9 Describe the Floor wall and kitchen counter.

3. Understand the interior of Modern bath/toilet

- 3.1 Define the modern toilet
- 3.2 Describe the function of modern toilet.
- 3.3 Describe the list of fitting & fixture of modern toilet
 - 3.4 Describe the floor, wall & ceiling materials in used modern toilet.
 - 3.5 Describe the different fixture with dimension in toilet.
 - 3.6 Describe the different toilet fixture clearance in toilet.
 - 3.7 Describe of function of toilet cabinet.
 - 3.8 Describe the characteristic cabinet and ceiling materials.

4. Understand the Interior of modern Bed Room .

- 4.1 Define the modern bed room .
- 4.2 Describe the list of modern furniture for a bed room.
- 4.3 Describe different types of bed size in respect of bed room (Master bed, Child bed room ,Guest bed room)
- 4.4 Describe the modern cabinet and its function of bed room.

- 4.5 Describe the principle of wall panelling's in bed room.
- 4.6 Describe the various type of wall panelling's materials.

5. Understand the Interior of conference/Seminar room.

- 5.1 Define Conference room.
- 5.2 Define Seminar room.
- 5.3 Define the function of conference and seminar room.
- 5.4 Describe use of furniture of conference & seminar room.
- 5.5 Describe the equipment of multimedia and Audio visual system.
- 5.6 Describe the Floor ceilings materials of conference & seminar room.

6. Understand the décor and detail of stair and veranda railings.

- 6.1 List the décor materials for stair.
- 6.2 Describe the different types of railing used in veranda and stair.
- 6.3 Describe the floor materials used in stair.
- 6.4 Describe the technic of fixing the railings in veranda and stair.

PRACTICAL :

1. Construct the detail drawing of modern kitchen with CAD.

- 1.1. Draw the different types of kitchen in respect of shape with detail dimension.
- 1.2. Draw the fixture in kitchen plan showing detail dimension.
- 1.3. Draw the cross sectional elevation of kitchen with dimension
- 1.4. Draw the section on kitchen counter and cabinet.
- 1.5. Draw the finish schedule of kitchen

2. Construct detail drawing modern Bath with CAD.

- 2.1. Draw the plan of bath room showing all dimension.
- 2.2. Draw the fittings and fixture in bathroom showing all dimension.
- 2.3. Draw the cross sectional elevation of bath on commond and bathtub.
- 2.4. Draw the finish schedule of bath room.

3. Construct detail drawing modern Bed room with CAD.

- 3.1. Draw the floor plan of bed room showing the furniture with dimension.
- 3.2. Draw the detail drawing of wall pannels.
- 3.3. Draw the lay-out plan of laying tiles and stone in different room of a residence.
- 3.4. Draw finish schedule of master bed room.

4. Construct detail drawings of dining room with CAD.

- 4.1. Draw the plan of dining room showing dimension.
- 4.2. Draw the lay-out plan of dining table and chair showing all dimension in respect of working clearance.
- 4.3. Draw the detail drawing of modern dining table and a chair .
- 4.4. Draw the plan and detail section, wall cabinet of a dining.

5. Construct the detail drawing of conference room with CAD.

- 5.1. Draw the plan of conference room 20 person seating.
- 5.2. Draw the layout of furniture of conference room with detail dimension in respect working clearance.
- 5.3. Draw the plan of false ceiling of conference room..
- 5.4. Draw the detail 3 Nos fitting & fixing of false ceiling (Two or three layer) with necessary light provision.
- 5.5. Draw the finish schedule of a conference room.

6. Construct the detail working drawing of stair with CAD.

- 6.1. Draw the plan of different types of staircase with all dimension.
- 6.2. Draw the detail section of staircase .
- 6.3. Draw the detail drawing of fixing blustered and newel post of stair.
- 6.4. Draw the detail drawing of handrail and railing .

REFERENCE BOOKS

1. Graphics Standard Building
2. Architectural Drafting -1
Syed Mazharul Haque
Bangladesh Technical Education Board
2. Architectural Drafting -2
Syed Mazharul Haque
Bangladesh Technical Education Board
3. Time Saver Standard Building Type
By Joseph De Chirra.

AIMS

To be able to-

- Understand the fundamentals of landscape design
- Use of Land and water, Vegetation.
- Importance of Climate, site, spaces, visible landscape, and circulation.
- Layout of water bodies, landscape & visit the site,
- Prepare a landscape model.

SHORT DESCRIPTION

Fundamentals of landscape; Use of land & water; Importance of Site, Spaces, Visible landscape, and Circulation. Layout of water bodies, landscape & visit the site.

DETAIL DESCRIPTION**1.0 Understand the fundamentals of landscaping.**

- 1.1 Define Landscape and landscape design.
- 1.2 Describe the necessity of landscape design.
- 1.3 Identify the elements of landscape design.
- 1.4 Describe the importance of nature in landscape.
- 1.5 Describe ecological basis and ecological balance.
- 1.6 Explain the landscape character.
- 1.7 Explain the natural forces, forms and feature.
- 1.8 Explain the importance of the built-environment.

2.0 Understand the use of land.

- 2.1 State the land.
- 2.2 Describe the land as heritage
- 2.3 Describe the land as resource.
- 2.4 Explain the land grants and land rights.
- 2.5 Describe the importance of land surveying.
- 2.6 Discuss various uses of land.
- 2.7 Define earth forms and slope retention.

3.0 Understand the use of water.

- 3.1 State the planning approach of water related site design.
- 3.2 Describe water as resource.
- 3.3 Explain water as landscape feature.
- 3.4 Define streams and rivers.
- 3.5 Discuss pools, fountains, cascades.
- 3.6 Define swimming pool and its standard measurement.

4.0 Understand the importance of vegetation.

- 4.1 List the indoor and outdoor plants.
- 4.2 Describe different elements of plants in nature.
- 4.3 State plantation.
- 4.4 Discuss the importance and necessity of plantation and gardening.
- 4.5 Describe the planned and planted landscape.
- 4.6 Differentiate between the micro and macro climate.
- 4.7 Describe the effect of climate on plants.

5.0 Understand the importance of climate.

- 5.1 Define weather and climate.
- 5.2 Differentiate between weather and climate.
- 5.3 Describe the physical and social characteristics of climate.
- 5.4 Explain different type of climate region.
- 5.5 Describe the microclimatology.

6.0 Understand the Site.

- 6.1 Define site
- 6.2 Describe the site selection process.
- 6.3 Compare the alternative sites and the ideal site.
- 6.4 Define site analysis and list out the procedure of systematic site analysis.
- 6.5 Discuss specification for topographic survey.
- 6.6 Describe the environmental impact assessment.
- 6.7 Explain the conceptual plan with diagram of the planning-design process.
- 6.8 Explain the terms of site systems.
- 6.9 Describe the site development guidelines (A checklist of helpful considerations).

7.0 Understand the Spaces.

- 7.1 Define site volumes.
- 7.2 Describe the spatial impact, spatial qualities, size, form and color.
- 7.3 Explain abstract spatial expression and definitions of volumes.
- 7.4 Distinguish the base plane and the overhead plane with examples.
- 7.5 Define the verticals.
- 7.6 Describe the verticals as enclosure for privacy.

8.0 Understand the visible landscape.

- 8.1 Define view and vista with their components.
- 8.2 Describe the axis and the axial characteristics.
- 8.3 Explain the axis as unifying elements with the example.
- 8.4 Explain symmetrical plan and asymmetrical plan.
- 8.5 Explain the visual resource management.

9.0 Understand the circulation.

- 9.1 Define motion
- 9.2 Discuss motion impelled by form and concept and the kinematics of motion.
- 9.3 Explain the pedestrian traffic and the planning consideration of pedestrian traffic- things seen, base plane, distance and grade and traffic flow.
- 9.4 Explain the automobile traffic and the planning consideration of automobile traffic-the road way, approach drive, entrance court and the parking compound.
- 9.5 Describe the rain, water and air movements.

PRACTICAL

1.0 Prepare a layout plan by visit the site.

- 1.1 Visit a given site and present a report about the site with photographs.
- 1.2 Draw the site plan showing existing structure,
- 1.3 Draw different roads and pavement and drive way.
- 1.4 Draw the parking of the site.
- 1.5 Sketch the surface water drainage and disposal plan of the given plot.

2.0 Prepare the layout of pools, fountain, low and high land and water bodies.

- 2.1 Sketch the different earth forms.
- 2.2 Sketch the various types of slope retention.
- 2.3 Sketch the docks, decks, overlooks, terraces and balconies on the slope of the banks.
- 2.4 Sketches the slope treatment or water edge detail of different water bodies.
- 2.5 Sketches the pools, fountain and cascades.
- 2.6 Draw the plan and section of a swimming pool.

3.0 Prepare a landscape plan of a room corner or garden or park.

- 3.1 Visit a park and find out the point of renovation and present a report on it with photographs.
- 3.2 Sketches the plan and elevation of some small plants, trees (canopy, intermediate, shrubs, vines and ground covers) and bushes.
- 3.3 Draw the form and space modulation of plants.
- 3.4 Sketches the trees as screen, natural shading device, slope and watershed protection, noise abatement and ornamentation.
- 3.5 Design a corner of a room/ a lobby/ a mini garden/ a lawn corner / a terrace corner with plants, seats and small pool or fountain.

4.0 Prepare a site plan.

- 4.1 Draw a topographic survey map.
- 4.2 Draw a site analysis map.
- 4.3 Draw the wind movement and sun path diagram.
- 4.4 Draw the site schematic plan.
- 4.5 Draw a final site plan.

5.0 Design a canopy or a fountain as a landscape element with model.

- 5.1 Draw the plan of the canopy/fountain.
- 5.2 Draw the elevation of the canopy/fountain.
- 5.3 Sketch a 3D view (isometric/perspective) of the canopy/fountain.
- 5.4 Make a model of the canopy/fountain.

Ref:

- Landscape Architecture, John Ormsbee Simonds

AIMS:

To be able to develop knowledge, skill and attitude in the field of Computer Rendering & Animation (Sketchup) with special emphasis on:

- Drawing environments and drawing aids.
- Different setup of drawing in Sketchup.
- Drawing commands.
- Modification & edits of drawing.
- V-Ray.
- Printing the drawing elements.

SHORT DESCRIPTION:

Drawing environments and drawing aids; Different setup of drawing in Sketchup; Drawing commands; Modification & edits of drawing; camera, material assign, lighting setup, V-ray;- camera, lighting, Rendering etc.

PRACTICAL

- 1. Set up the drawing environments and drawing aids.**
 - 1.1. Install & Start Sketchup software.
 - 1.2. Identify the different areas of Sketchup screen.
 - 1.3. Use menu bar, command prompt area, toolbox, units and drawing aids.
 - 1.4. Use the drawing aids, different menus and dialog boxes of Sketchup package.
 - 1.5. Import the CAD file into Sketchup.
 - 1.6. Apply how to save the drawing & exit from the file.
- 2. Construct the geometrical shape or object.**
 - 2.1. Use the command to draw Line.
 - 2.2. Erase the object using different erase commands.
 - 2.3. Draw rectangle using rectangle commands.
 - 2.4. Draw circles using different method of circle commands.
 - 2.5. Draw polygon using different method of polygon commands.
 - 2.6. Draw arc using different commands of arc.
 - 2.7. Use the freehand tools to create polygons.
 - 2.8. Use the paint tools.
- 3. Edit and modify the object.**
 - 3.1. Select and delete the object.
 - 3.2. Move objects using the move tool.
 - 3.3. Use the push/pull tool.
 - 3.4. Rotate the object in different angle /direction using rotate command.
 - 3.5. Draw lines/object in certain distance using offset commands.
 - 3.6. Use scale command to enlarge or reduce an object in a ratio
 - 3.7. Use the orbit tool to see the rotating view of any object.
- 4. Dimensioning/measurement the object.**
 - 4.1. Use the Tape measure tool to dimensioning the object.
 - 4.2. Put dimension in the object using linear, angular, radius, diameter, ordinate, align, center, mark, continuous, base line commands.
 - 4.3. Use the protractor tool to measure the circular/rotating dimension.

- 4.4. Use the axis tool to measure the axis.
- 4.5. Edit dimension.
- 5. Operate the object using the scroll/zoom command.**
 - 5.1. Use the pan tool.
 - 5.2. Use zoom tool to customize the object size on screen.
 - 5.3. Show the objects various ways use zoom extends & zoom window tool.
 - 5.4. Show the objects earlier view using the previous tool.
 - 5.5. See the objects from outdoor and indoor using the walk & look around tool.
- 6. Operate the status bar**
 - 6.1. Use Undo tool to cancel the immediate doing works.
 - 6.2. Use Redo tool to recreate the works.
 - 6.3. Use help tool.
 - 6.4. Use the language tool for writing the text.
 - 6.5. Look out the overview of an object use feedback & status tool.
- 7. Construct the shade-shadow using shadow command.**
 - 7.1. Use wireframe to show the skeleton of the object.
 - 7.2. Use hidden tool to conceal the skeleton of the object.
 - 7.3. Show the shaded view using shaded command.
 - 7.4. Show the shaded view with texture.
- 8. Produce different view using view command.**
 - 8.1. Show isometric view in different angle using isometric view tool.
 - 8.2. Use the front, back, left, right view tool to show the view of the object.
 - 8.3. Use the top & bottom view tool to show the view of the object.
- 9. Operate the different panels.**
 - 9.1. Use the entity info tool for the works.
 - 9.2. Use the instructor & components tool.
 - 9.3. Show the materials on the object.
 - 9.4. Use the layers tool for the drawing.
 - 9.5. Use the Scene & Display command.
- 10. Set up the camera & control.**
 - 10.1. Operate the Target and free Camera.
 - 10.2. Use lens, FOV, Dolly camera etc.
 - 10.3. Apply two cameras for the projects and adjust necessary parameters.
 - 10.4. Set two Viewport for Rendering.

11. Assign the materials & Show Materials on object.

- 11.1. Use Material Editor Dialogue box and its necessary Tools.
- 11.2. Prepare a material Slot by adding Color.
- 11.3. Apply a Material to a object.
- 11.4. Create a glass Material by using Refraction Map.
- 11.5. Create a MS/SS material and assign it to the railing of the Project.
- 11.6. Create a Multi/sub material for Windows and assign it to the Project.

12. Set up Lighting & texture mapping .

- 12.1. Show standard and Photometric Light.
- 12.2. Create Standard Light (Target Spot, Target Direct, Omni etc.)
- 12.3. Use general parameters, Intensity parameters, spot light parameters, Shadow parameters etc.
- 12.4. Apply 1 or 2 standard light to the project and adjust the necessary parameters for best output.
- 12.5. Use Texture/Bitmap for material.
- 12.6. Practice to tilling the texture, Real-world scale, bitmap rotate reloads etc.
- 12.7. Assign Texture material slot to an object and apply UVW Map Modifier.
- 12.8. Create necessary numbers of texture materials and assign them to the project.

13. Perform Rendering.

- 13.1. Familiar with Render Setup dialogue Box.
- 13.2. Use render output size and apply it for the project.
- 13.3. Select a camera View and render it.
- 13.4. Save the Render Image in different formats such as BMP, JPEG, PNG, TIF, Targa image etc.

14. Install and setup V-Ray .

- 14.1. Use V-Ray and its different version for Sketch up.
- 14.2. Perform V-Ray installation for Sketch up.
- 14.3. Perform V-Ray setup for Sketch up.

15. Set up V-Ray Camera & Rendering for Sketch up

- 15.1. Use V-Ray Target and free Camera.
- 15.2. Use V-Ray lens, FOV, Dolly camera etc.
- 15.3. Apply to V-Ray cameras for the projects and adjust necessary parameters.
- 15.4. Set to Viewport for Rendering.
- 15.5. Create V-ray Sun.
- 15.6. Create V-ray Dome Light.
- 15.7. Create V-ray HDR Light.
- 15.8. Create V-ray Light (plane light, spot light, photometric web light).
- 15.9. Assign V-ray light to the Project and render it for output.

16. V-Ray Rendering for Sketch up

- 16.1. Use v-ray as an assign render under common tab of render setup Dialogue box.
- 16.2. Use V-ray tab and its Sub/Parameters.
- 16.3. Use indirect illumination Tab and its Sub parameters.

16.4. Setting and its sub parameters.

17. V-ray Materials for Sketch up

- 17.1. Create a V-ray material slot for color and assign it to an object.
- 17.2. Create a V-ray material slot for bitmap and assign it to an object.
- 17.3. Create material for glass, mirror, MS, SS.
- 17.4. Create Multi/sub material for window and door.
- 17.5. Assign V-ray material to the Project and render it for output.

18. Prepare a portfolio of a project.

- 18.1. Import the cad file of a project.
- 18.2. Draw base of the structure.
- 18.3. Use modify tool as requirements.
- 18.4. Use push/pull tool if needed.
- 18.5. Add detail to the structure.
- 18.6. Paint the structure.
- 18.7. Save the project.
- 18.8. Print the project.

AIMS

- To be able to consolidate and extend the fundamental understanding of the behavior of statically determinate structures i.e. beams, frames etc.
- To be able to develop of awareness of structural behavior such as deflection and stability of masonry dam.
- To be able to develop understanding for selection of suitable section of beam and member of the truss.

SHORT DESCRIPTION

Shear force and bending moment of beams; Stresses in beams; Deflection of beams; Joints and connections; Forces in frames; Steel structure; Masonry dam; Column; Moving loads; Thin Cylindrical shells.

DETAIL DESCRIPTION**Theory:****1. Understand shear force and bending moment of beams.**

- 1.1 Define determinate, indeterminate and homogeneous structure.
- 1.2 Mention different types of support condition.
- 1.3 Explain the relations between shear force and bending moment.
- 1.4 Define dangerous section and point of contra flexure.
- 1.5 Solve problems on SF and BM of cantilever beam with concentrated load, distributed load, inclined load and combined loads.
- 1.6 Solve problems on SF and BM of simply supported beam with concentrated load, distributed load, inclined load and combined loads.
- 1.7 Solve problems on SF and BM of overhanging beam with concentrated load, distributed load, inclined load and combined loads.

2. Understand the bending stresses in beams.

- 2.1 State the meaning of bending stresses in beam.
- 2.2 List the assumptions of bending stresses in beam.
- 2.3 Differentiate between bending moment and bending stress.
- 2.4 Express and derivation of the formula for bending stress.
- 2.5 State the meaning of elastic section modulus.
- 2.6 Solve problems on section modulus of circular, rectangular, I, T, L and hollow sections of beams.
- 2.7 Solve problems on bending stresses of circular, rectangular, I, T, L and hollow sections of beams.

3. Understand the shearing stresses in beams.

- 3.1 State the meaning of shearing stresses in beam
- 3.2 Differentiate between maximum and average shear stress.
- 3.3 Relate maximum shear stress and average shear stress for rectangular, circular and triangular section.
- 3.4 Express the derivation of the formula for shearing stress.

- 3.5 Solve problems on shearing stresses of circular, rectangular, I, T, L and hollow sections of beams.
- 3.6 Determine the section of homogeneous beam with respect to shearing stress and bending stress.

4. Understand the deflection of beams.

- 4.1 Define the meaning of deflection of beam and elastic curve.
- 4.2 List the assumptions of deflection of beam.
- 4.3 State the maximum allowable deflection for RCC beam, RCC slab and steel beam.
- 4.4 Express the derivation of equation for elastic curve
- 4.5 State the 1st and 2nd area moment proposition.
- 4.6 Compute the slope of elastic curve for cantilever beam with concentrated and distributed load.
- 4.7 Compute the maximum deflection for cantilever beam with concentrated and distributed load.
- 4.8 Compute the slope of elastic curve for simply supported beam with symmetrically concentrated and distributed load.
- 4.9 Compute the maximum deflection for simply supported beam with symmetrically concentrated and distributed load.

5. Understand the concept of steel structure and joints.

- 5.1 Define steel structure.
- 5.2 Describe joint and connections of steel structure.
- 5.3 State the differences between cold rolled and built up section.
- 5.4 Name the elements of pre-fabricated building.
- 5.5 Define pitch, back pitch and repeating section.
- 5.6 State the necessity of joints.
- 5.7 Classify joints and state efficiency of joints.
- 5.8 Explain the modes of failure and remedial measures of riveted joints.
- 5.9 Solve problems on simple lap joint and butt joint subjected to axial load only.

6. Understand the significance of welded connections.

- 6.1 Define terms: Fillet, Leg, Throat.
- 6.2 State the significance of welded connections.
- 6.3 Classify different types of welded connections.
- 6.4 Mention the merits and demerits of welded connections.
- 6.5 Solve problems on fillet weld connection subjected to axial load only.
- 6.6 Solve problems on butt weld connection subjected to axial load only.

7. Understand the action of forces in steel frames.

- 7.1 Define the terms: truss, tie, strut, redundant, deficient, web and chord member, perfect, imperfect frame.
- 7.2 Mention different types of roof trusses, bridge trusses and beams.
- 7.3 State the fundamental assumptions in trusses.
- 7.4 Describe the methods of computing forces in trusses.
- 7.5 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by Analytical (joint and moment) method.
- 7.6 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by graphical method.

8. Understand the stability of masonry dam.

- 8.1 Define dam and mention the functions of a dam.

- 8.2 Mention the different types of dam.
- 8.3 Explain the stability of a masonry dam.
- 8.4 State the meaning of middle third law.
- 8.5 Express the derivation of the equation for minimum width of the base for just no tension.
- 8.6 Calculate the maximum and minimum pressure on the foundation bed for rectangular dam
- 8.7 Calculate the maximum and minimum pressure on the foundation bed for trapezoidal dam having water face vertical only.
- 8.8 Solve problems on stability of the dam.

9. Understand the elastic buckling of columns.

- 9.1 State the meaning of short and long column.
- 9.2 Mention the type of columns on the basis of end conditions.
- 9.3 Compare the equivalent length of different columns.
- 9.4 Interpret the Euler's formula for flexural buckling of a pin ended strut/column.
- 9.5 Calculate the safe load on column using Euler's formula.
- 9.6 State the Rankin-Gordon formula.
- 9.7 Calculate the safe load on column using Rankin-Gordon formula.

10. Understand the concept of moving loads.

- 10.1 State the meaning of moving load.
- 10.2 Classify different types of moving loads.
- 10.3 State the meaning of influence line.
- 10.4 Draw influence line for single concentrated load and reaction of a simply supported beam.

11. Understand the concept of Thin Cylindrical Shells.

- 11.1 Define cylindrical shell.
- 11.2 Failure of a cylindrical shell due to an internal pressure.
- 11.3 Stresses in a thin cylindrical shell.
- 11.4 Circumferential stress.
- 11.5 Longitudinal stresses.
- 11.6 Design of thin cylindrical shells

PRACTICAL:

1. Determine shear force & bending moment at different sections of simply supported beam with different types of load and draw the diagrams.
2. Determine shear force & bending moment at different sections of overhanging beam with different types of load and draw the diagrams.
3. Determine the position of dangerous section and inflection point or point of contra flexure of overhanging beam and show in diagram.
4. Determine the bending stresses of circular, rectangular & hollow sections of beams and draw the diagrams.
5. Determine the bending stresses of I, T, L sections of beams and draw the diagrams.
6. Determine the shearing stresses of circular and rectangular sections of beams and draw the diagrams.
7. Determine the shearing stresses of I & T sections of beams and draw the diagrams.
8. Determine the section of homogeneous beam with respect to shearing stress and bending stress.
9. Determine the deflection of cantilever and simply supported beam with respect to concentrated/distributed load.
10. Draw the neat sketches of different type of riveted joints showing the mode of failures.

11. Determine the forces developed on the member of a truss graphically.
12. Prepare some models of different types of truss with suitable materials.
13. Draw a sketch of a pre-fabricated building and show the different elements in the figure.

REFERENCE BOOKS

- | | | |
|---|---|------------------------|
| 1. Theory of simple structure | - | T C Shed and J Vawter |
| 2. Strength of materials and structures | - | J Case and A H Chilver |
| 3. Theory of structures | - | R S Khurmi |
| 4. Strength of Materials | - | R S Khurmi |
| 5. Steel Structure | - | Gay Lord |

AIMS

- To be able to understand the fundamental of air condition.
- To be able to understand the construction procedure of air condition system.
- To be able to understand the fundamental of architectural acoustics.
- To be able to prepare materials schedule, cost and development process.

SHORT DESCRIPTION

Materials for air conditioning system, acoustics materials, false ceiling, sound absorption, auditorium acoustics etc. Cooling & heating load calculation. K, C, R & U factor, various types of lighting.

THEORY:

- 1. Understand air conditioning in Building Design.**
 - 1.1 Define air conditioning
 - 1.2 Describe necessity of air conditioning in building
 - 1.3 Explain conductivity, convection, radiation.
 - 1.4 Discuss the convert of Fahrenheit temperature to Celsius.
- 2. Understand the air conditioning ducting system.**
 - 2.1 Define duct shape.
 - 2.2 Mention duct size.
 - 2.3 Describe pressure loses in air distribution system.
 - 2.4 Define the supply & return duct system.
 - 2.5 Define duct fittings & terminal units.
 - 2.6 Mention duct construction & reinforcement.
- 3. Understand the fundamental of air conditioning.**
 - 3.1 Define air conditioning **BTU** heat transmission co efficient.
 - 3.2 Describe the necessity of air conditioning in building.
 - 3.3 Name different elements of air condition unit suitable for use in all weather.
 - 3.4 Name the factors to be considered in designing air conditions in an office.
 - 3.5 Explain the heat load and cooling load of a building.
 - 3.6 Describe how to calculate the heat for air conditioning system.
- 4. Understand the electrical heat.**
 - 4.1 Define the general concept of electric heat.
 - 4.2 List the electric heat equipment.
 - 4.3 Mention the application of electric equipment.
 - 4.4 Explain the term of diversity factor.
- 5. Understand the lay-out plans of air conditioners.**
 - 5.1 Name the different elements of an air conditioning unit suitable for use in all weathers.
 - 5.2 Name the factors to be considered in designing air conditioners in an office/a living room /a library
 - 5.3 Draw a diagram showing all the necessary elements of a weather air –conditioning unit for a library, hall room and auditorium.
- 6. Understand the concept of architectural acoustics.**
 - 6.1 Define sound propagation, frequency, velocity and wavelength.
 - 6.2 Define Echo.
 - 6.3 Describe between echo, reverberation and resonance.
 - 6.4 Describe the different between sound absorption and sound insulation.
 - 6.5 State what are the assumptions on which the reverberation time formula in based.

6.6 List the different types of acoustical Materials and their uses.

7. Understand cooling load estimate.

- 7.1 Building survey and load Estimate.
- 7.2 Design condition.
- 7.3 Heat storage, Diversity and stratification.
- 7.4 Solar heat gain thru glass.
- 7.5 Heat and water vapour flow thru structures.
- 7.6 Infiltration and Ventilation.
- 7.7 Internal and system heat gain.
- 7.8 Applied psychometrics.
- 7.9 Air handling apparatus.
- 7.10 Air duct design.
- 7.11 Room air distribution.

8. Understand the heat loads and cooling loads of a residence.

- 8.1 Explain the heat load and cooling load of a residence.
- 8.2 Explain variable load and constant load of a building.
- 8.3 List the factors influence for summer and winter air conditioning.
- 8.4 Describe how to calculate the heat for air-conditioning system.
- 8.5 Explain the methods of controlling the temperature.
- 8.6 Explain how maintain comfortable condition of efficient working.

9. Understand the different sources of Noise.

- 9.1 Define Noise.
- 9.2 State the sources of Noise.
- 9.3 List the different types of Noise.
- 9.4 List the different types of materials use for noise control.

10. Understand the fundamentals of architectural acoustics.

- 10.1 Define sound propagation velocity and wavelength.
- 10.2 Explain acoustic power, pressure intensity and sound pressure level.
- 10.3 Explain sound reflection absorption and transmission.
- 10.4 Describe the behaviour of sound in an enclosed space.
- 10.5 Mention the characteristics of acoustical absorption materials other than their absorptivity which are important to material selection.

11. Understand the auditorium acoustics.

- 11.1 Explain room volume and shaping.
- 11.2 Describe the construction of reflective and absorptive panels.
- 11.3 Describe sound control in different types of room.
- 11.4 Describe the selection of reverberation time for a design.
- 11.5 Describe the acoustics materials.

12. Understand the Vision, Reflection, Brightness, Colour of surface upon vision, characteristics of incandescent, fluorescent, neon, sodium and mercury lamps.

- 12.1 Define vision, reflection and brightness.
- 12.2 Explain the influence of colour of a surface upon the quantity of vision.
- 12.3 Identify factors that influence the brightness of light on a surface.
- 12.4 Name different types of lamps.
- 12.5 Identify the distinguishing features of different types of lamps.
- 12.6 Distinguish among the characteristics of different types of lamps.
- 12.7 Explain the advantages of fluorescent over incandescent lamps, mercury over sodium lamps.
- 12.8 Name the uses of different types of lamps.

13. Understand absorption, reflection, transmission, different types of luminaries, and their glare and brightness, influence of light in office. Commercial, Industrial and domestic buildings.

- 13.1 Explain absorption, reflection and transmission of light.

- 13.2 Name different types of luminaries.
- 13.3 Define glare and brightness of luminaries.
- 13.4 Explain the factors that determine the glare and brightness of different luminaries.

PRACTICAL:

- 7. Collect the commercial sound absorbing materials**
- 8. Sketch the sound isolation barriers.**
- 9. Building Orientation in climate condition.**
- 10. Sketch the sound alteration closed and open plans.**
- 11. Sketch Ray-Diagram of room Acoustics.**
- 12. Draw sound path in Auditorium, Library, Hall room**
- 13. Draw the basic cooling system.**
- 14. Site visit and prepare report submission on shopping mall/hospital.**
- 15. Calculate the cooling load calculation of a room.**
- 16. Installation a split type /window type air conditioner.**
- 17. Study the thermal conductivity and thermal conductance chart.**
 - 11.1 Find out the value of K of common brick, wood, cellular.**
 - 11.2 Find out the C value of sand aggregate cinder aggregate, tiles, plywood and glass of different thickness.**
 - 11.3 Solve problems relating to conductance.**
- 12. Study the peoples load.**
 - 12.1 Calculate the peoples load for a general office.
 - 12.2 Calculate the peoples load for a Gymnasium/Auditorium/Restaurant
- 13. Study infiltration and ventilation load.**
 - 13.1 Calculate the amount of fresh air/ventilated air for a comfort air conditioning.
 - 13.2 Solve problems related to infiltration and ventilation load.

REFERENCE BOOKS

- 1. Concept in Architectural Acoustics**
M. DAVID EGAN
- 2. Handbook of Air Conditioning system Design**
Carrier Air Conditioning Company
- 3. A course in Refrigeration and Air conditioning**
Arora, Domkundwar
- 4. Principles of Refrigerator**
Roy J, Dossat

AIMS

- To be able to develop the working condition in the field of industrial or other organization.
- To be able to understand develop the labor management relation in the industrial sector.
- To be able to develop the management techniques in the process of decision making.
- To be able to manage the problems created by trade union.
- To be able to understand Planning
- To be able to perform the marketing.
- To be able to maintain inventory.

Course Outline

Basic concepts of management; Principles of management; Planning, Organization, Scientific management; Span of supervision; Motivation; Personnel management and human relation; Staffing and manpower planning ; Training of staff; Concept of leadership; Concepts and techniques of decision making; Concept of trade union; Inventory control; Economic lot size ; Break even analysis; Trade Union and industrial dispute, Marketing;

1 Basic concepts & principles of management.

- 1.1 Define management and industrial management.
- 1.2 State the objectives of modern management.
- 1.3 Describe the scope and functions of management.
- 1.4 State the principles of management.
- 1.5 State the activity level of industrial management from top personnel to workmen.
- 1.6 Describe the relation among administration, organization & management.

2. Concept of Planning

- 2.1 Define Planning
- 2.2 Discuss the importance of Planning
- 2.3 Discuss the Types of Planning.
- 2.4 Discuss the steps in Planning

3 . Concepts of organization and organization structure.

- 3.1 Define management organization.
- 3.2 State the elements of management organization.
- 3.3 Describe different forms of organization structure.
- 3.4 Distinguish between line organization and line & staff organization.
- 3.5 Distinguish between line organization and functional organization.
- 3.6 Describe the features, advantages and disadvantages of different organization structure.

4. Concept of scientific management.

- 4.1 Define scientific management.
- 4.2 Discuss the basic principles of scientific management.
- 4.3 Explain the different aspects of scientific management.
- 4.4 Discuss the advantages and disadvantages of scientific management.
- 4.5 Describe the difference between scientific management and traditional management..

5. Concept of span of supervision.

- 5.1 Define span of supervision and optimum span of supervision.
- 5.2 Discuss the considering factors of optimum span of supervision.
- 5.3 Discuss advantages and disadvantages of optimum span of supervision.
- 5.4 Define delegation of authority.
- 5.5 Explain the principles of delegation of authority.
- 5.6 Explain the terms: authority, responsibility and duties.

6 . Concept of motivation.

- 6.1 Define motivation.
- 6.2 Discuss the importance of motivation.

6.3 Describe financial and non-financial factors of motivation.

6.4 Special Motivational Techniques.

6.5 Discuss the motivation theory of Maslow and Herzberg.

6.6 Differentiate between theory-X and theory-Y.

7. Concept of leadership.

7.1 Define leadership.

7.2 Discuss the importance and necessity of leadership.

7.3 Discuss the functions of leadership.

7.4 Describe the qualities of a leader.

8. Basic concepts and techniques of decision making.

8.1 Define decision making.

8.2 Discuss the importance and necessity of decision making.

8.3 Discuss different types of decision making .

8.4 Describe the steps in decision making.

9. Concept of personnel management and human relation.

9.1 Define personnel management.

9.2 Discuss the functions of personnel management.

9.3 Define staffing.

9.4 Define recruitment and selection of employees.

9.5 Describe various sources of recruitment of employees.

9.6 Describe the methods of selection of employees.

9.7 Define training and orientation of employee.

9.8 Discuss the importance and necessity of training.

9.9 Discuss the various methods of training of workmen, technicians and executive personnel.

10. Concept of inventory control & Economic lot size

10.1 Define inventory & inventory control.

10.2 Describe the function of inventory control.

10.3 Define Economic lot size and the Method of determination of economic lot size.

10.4 Discuss the effects of over supply and under supply.

10.5 Explain the following terms :

- Bin card or Bin tag.
- Purchase requisition.
- Store requisition.
- Material transfer note.
- First in first out (FIFO).
- Last in first out (LIFO).
- Safety stock
- Lead time

11. Concept of Break Even Point (BEP)

11.1 Define Break Even Point and Break Even Chart.

11.2 Describe the method of determination of BEP

11.3 Explain the terms :

- Break even analysis.
- Fixed cost.
- Variable cost

12. Concept of Marketing

12.1 Define marketing.

12.2 Discuss the function of marketing.

12.3 State the objectives of marketing.

12.4 Explain the terms :

- Purchase
- Brand
- Producer
- Consumer
- Customer
- Copyright
- Trade mark

12.5 Discuss product life -cycle and marketing strategies in different stages of a product life-cycle

13. Concept of trade union and industrial dispute

13.1 Define trade union.

- 13.2 Mention the objectives of trade union.
- 13.3 Discuss the function of trade union.
- 13.4 Describe different types of trade union.
- 13.5 Define industrial dispute
- 13.6 Discuss different type of industrial dispute

REFERENCE BOOKS

1. Dr. Md. Mainul Islam and Dr. Abdul Awal Khan-Principles of Management, Bangladesh Open University.
 2. Mohammad Mohiuddin-Personnel Management and Industrial Relation, NIDS Publication Co. Dhaka.
 3. সুফিয়া বেগম, মো: জাহেদুল হক ও সুপ্রিয়া ভট্টাচার্য্য-ব্যবস্থাপনা এর মৌলিক ধারণা, ব্যতিক্রম প্রকাশনী ঢাকা।
- Matz Usry-Cost Accounting: Planning & Control.