



BANGLADESH TECHNICAL EDUCATION BOARD
Agargaon, Dhaka-1207.

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

CIVIL (WOOD) TECHNOLOGY
TECHNOLOGY CODE: **665**

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CIVIL (WOOD) TECHNOLOGY (665)

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	66462	Transportation Engineering-1	2	3	3	40	60	25	25	150
2	66463	Design of Structure-1	2	3	3	40	60	25	25	150
3	66464	Civil Engineering Drawing-3 (CAD)	1	6	3	20	30	50	50	150
4	66561	Design and drawing of Furniture -2	1	6	3	20	30	50	50	150
5	66562	Wood Seasoning, Treating & Finishing Materials	2	3	3	40	60	25	25	150
6	66563	Wood Working Machine & Tools	2	3	3	40	60	25	25	150
7	65852	Industrial Management	2	0	2	40	60	0	0	100
Total			12	24	20	240	360	200	200	1000

AIMS

- To be able to understand the standard types of construction used in Bangladesh for road & pavement, bridge & culvert to assess the advantages and disadvantages of each type.
- To be able to understand the procedure, methods & techniques used in Construction of road & pavement, drainage system, bridges & culverts, Embankment & cuttings.
- To be able to understand the importance of traffic control system.
- To be able to understand the maintenance, servicing & repair procedure, methods & techniques used to keep the highway operational.
- To be able to acquaint with the different aspects of airport construction.

SHORT DESCRIPTION

Modes of transportation and history of road development; Highway planning; Road Alignment and survey; Highway geometrics; Sub-grade soil; Highway materials, Construction of road formation & classification of road; Low cost road; Water bound macadam road; Bituminous road; Cement concrete road; Hill road; Highway drainage; Traffic control; Road arboriculture; Highway machinery; Highway failures & maintenance; Highway bridges & culverts; Planning of airport; Geometric standard in airport, airport building & warehouses.

DETAIL DESCRIPTION**Theory:****1. Understand the modes of transportation, concept of highway planning and concept of alignment of road and survey.**

- 1.1 Classify transportation.
- 1.2 Explain the importance of transportation.
- 1.3 Mention the benefits of good road system.
- 1.4 Mention the characteristics of important early roads.
- 1.5 Explain the importance of highway planning.
- 1.6 Classify the road according to location & functions; Mention the objectives of road planning & survey.
- 1.7 Define alignment and fundamental principles of alignment of road.
- 1.8 Describe the reconnaissance, preliminary, final location survey and soil survey for a road construction.
- 1.9 Mention the points to be considered in fixing location of a new urban road.

2 Understand the principles of highway geometric, Highway Cross-section and intersections.

- 4.1 Define and classify the highway geometric and the level intersection of roads into broad categories such as:
 - a) Cross-sectional elements (camber, super elevation, Curve, Right of way and Gradient)
 - b) Visibility
 - c) Horizontal / Vertical curves
 - d) Road intersections

- 4.2 Define the terms right of way, formation width, side slope, berm, embankment, cutting, shoulder, carriage way width, footpath, cycle track, parking lanes, median strip, kerb, skid, slip and Friction of a Road.
- 4.3 Mention the factors that affect friction of coefficient and the highway geometrics.
- 4.4 Explain the necessity of camber, gradient, super elevation and curve.
- 4.5 Describe the procedure of providing camber, gradient, super elevation and curve in road.
- 4.6 Solve the problems on super elevation.
- 4.7 Mention the factors on which the curves and gradient of a road depend.
- 4.8 Mention the purposes of intersection of roads.
- 4.9 Mention the advantages and disadvantages of each type of intersections and Grade separations.
- 4.10 Define underpass and Overpass.

3 Understand the concept of sight distance.

- 3.1 State the reaction time and reaction distance.
- 3.2 State the braking time and braking distance.
- 3.3 Classify the various types of sight distances.
- 3.4 Describe each type of sight distances.
- 3.5 Solve problems on stopping sight distance and passing sight distance.

4 Understand the characteristics of sub-grade soil and materials for highway construction.

- 4.1 Define the term sub-grade in highway.
- 4.2 Describe the characteristics of different sub-grade soil.
- 4.3 Mention the suitable sub-grade for various types of highway construction.
- 4.4 Describe the procedure of improving sub-grade soil for road construction.
- 4.5 Describe construction of road in water logged area.
- 4.6 Mention the advantages and limitations of aggregates for highway construction.
- 4.7 List the tests required for aggregates used for highway construction.
- 4.8 Describe different types of bituminous materials for road construction.
- 4.9 State the properties of bituminous materials.
- 4.10 List the standard tests on bituminous materials.

5 Understand the concept of road formation and classification.

- 5.1 Describe the procedure of earth work in cutting, filling and compaction of soil and turving used in road embankment.
- 5.2 List the field tests needed to find out the good quality of compaction of soil for road construction.
- 5.3 Classify the road on the basis of materials, volume of traffic, type of traffic, number of lanes, direction of movement of traffic, area they traverse, cost of roads and rigidity of roads.
- 5.4 Classify and describe the various types of low cost roads (earthen, gravel, soil stabilized road)
- 5.5 Define and describe the preparation and construction procedure of WBM, bituminous, CC and RCC road.
- 5.6 Mention the advantages and disadvantages of WBM and Bituminous road.
- 5.7 Define the terms seal coat, tack coat and prime coat, bituminous carpet, bituminous concrete, sheet asphalt and mastic asphalt.
- 5.8 Mention the advantages and disadvantages of bituminous, CC and RCC road.
- 5.9 List and explain the joints for CC and RCC road with their specification and sketches and describe the functions of joint filers & sealers in CC and reinforcement & dowel bars in RCC road.
- 5.10 Distinguish between flexible and rigid pavement.

6 Understand the concept of hill road and highway drainage.

- 6.1 Mention the special points to be considered for alignment of hill road.
- 6.2 Define the terms: village path or track, bridle path, motor road, hill road,
Salient curves, re-entrant curve, hair pin bend, corner bend, trace cut.
- 6.3 State the meaning of retaining wall and breast wall.
- 6.4 Mention the causes of land slide and preventive measures of land slide.
- 6.5 Mention the requirements of highway drainage.
- 6.6 Mention the factors which control the design of highway drainage system.
- 6.7 Mention the effects of improper drainage.
- 6.8 Describe the highway drainage system.
- 6.9 Classify the highway drainage.
- 6.10 Define and classify of cross-drainage works.

7 Understand the concept of traffic signs.

- 7.1 Classify the different types of traffic signs.
- 7.2 Explain the importance of traffic signs.
- 7.3 Mention the utility of traffic studies.
- 7.4 Mention the utility of traffic regulations.
- 7.5 Mention the utility of traffic signs.

8 Understand the machineries used for construction of roads & highways.

- 8.1 List the machineries used for cleaning the site, earth cutting, earth removing,
Consolidating and grading in highway construction.
- 8.2 List the machineries used for crushing road metals.
- 8.3 List the machineries used for construction of bituminous road.
- 8.4 List the machineries used for construction of CC & RCC road.

9 Understand the causes of failures and maintenance of roads & highways.

- 9.1 Describe the sub-grade, base and wearing course failures.
- 9.2 Mention the typical failures of flexible pavement.
- 9.3 Mention the causes of failures of CC & RCC road.
- 9.4 Mention the typical failures of CC & RCC road.
- 9.5 Explain the significance of routine maintenance of highways.
- 9.6 Classify the maintenance work of road.
- 9.7 Describe the maintenance of
 - (a) Earthen road.
 - (b) Water bound macadam road.
 - (c) Bituminous road.
 - (d) CC & RCC road.
- 9.8 Mention the causes for corrugations and wavy surfaces.
- 9.9 Mention the remedies for corrugations and wavy surfaces.

10 Understand the highway bridges & culverts.

- 10.1 Distinguish between bridge and culvert.
- 10.2 Mention the ideal site for construction a bridge or culvert in roads & highways.
- 10.3 Classify the different types of bridges and culverts.
- 10.4 Mention the factors which affect the choice & type of bridge or culvert.
- 10.5 Define the terms: flood discharge, waterway, scouring depth, free board in the construction of
bridges & culverts.
- 10.6 Explain the necessity of repair and maintenance of bridges & culverts.

11 Understand the concept of planning of airport and the standard of geometrics used in airport.

- 11.1 Mention the information required for planning of an airport.
- 11.2 Mention the points to be considered in selecting the site for an airport.
- 11.3 Describe the terms: landing strip, approach zone, running lengths & hanger.
- 11.4 Classify different types of airport.
- 11.1 Explain the terms: runway, taxiway, aprons, runway orientation, pattern & grade.
- 11.2 Distinguish between runway and taxiway.
- 11.3 State the meaning of heliport.
- 1.4 Mention the functions of terminal building.
- 1.5 Distinguish between heliport and airport.

12 Understand the concept of airport building & warehouse.

- 12.1 Mention the functions of airport building.
- 12.2 Mention the facilities to be provided in airport building.
- 12.3 State the meaning of warehouse.
- 12.4 State the importance of warehouse.

Practical:

1. Setting an alignment of a new road.
2. Prepare the model of a typical clover leaf pattern of grade separation.
3. Perform crushing strength test of coarse aggregate used in road construction.
4. Perform abrasion test of coarse aggregate used in road construction.
5. Perform water absorption, specific gravity and density test of coarse aggregate used in road construction.
6. Perform the California Bearing Ratio (CBR) test.
7. Perform the aggregate impact value test.
8. Perform the test of grading of coarse aggregate.
9. Perform the following test for bitumen.
 - a. Loss of ignition
 - b. Softening point
 - c. Fire point.
 - d. Flash point
 - e. Marshal test
10. Prepare the models of different types of traffic signs.
11. Visit of a Fly Over/Overpass/Underpass/intersection/grade separation.
12. Visit of an International Airport.

REFERENCE BOOKS

1. Highway Engineering -by Gur Charan Singh
2. A text book on Highway Engineering and Airports -by S B Sehgal & K L Bhanot
3. Highway Engineering -by S C Rangwala
4. Highway and Airport Engineering -by V B Priyani

AIMS

- To be able to understand the properties of reinforced cement concrete (RCC).
- To be able to select the suitable size of reinforced concrete beams & lintels with reinforcement.
- To be able to supervise the placing of reinforcement for beams & lintel.

SHORT DESCRIPTION

Reinforced cement concrete; Theory of bending; Investigation of beam; Shear stress and bond stress; Design of reinforced cement concrete rectangular beam, T-beam, double reinforced beam and lintel.

DETAIL DESCRIPTION**Theory:**

- 1 Understand the different type of cement concrete and structural safety.**
 - 1.1 Describe and use of the plain concrete, reinforced concrete and pre-stressed concrete.
 - 1.2 Mention the advantages, disadvantages & limitations of the plain Concrete, reinforced concrete and pre-stressed concrete.
 - 1.3 Define and calculate young modulus of elasticity of concrete.
 - 1.4 Describe test procedure of crushing cubes and cylinders for compression test.
 - 1.5 Define Richter scale, tectonic plate and epicenter.
 - 1.6 Explain the necessity of considering the seismic load and wind load in designing reinforced concrete works.
 - 1.7 Mention the significant of the thrust (like tidal, cyclones etc.) to be consider in designing reinforced concrete structure in coastal zone.
 - 1.8 Explain the need for structural safety and safety provision.
- 2 Understand the properties & behavior of reinforcing steel used in RCC.**
 - 2.1 List the different types & grades of steel used in RCC and pre-stressed concrete.
 - 2.2 Mention the advantages of uses of mild steel in RCC.
 - 2.3 Describe the scope of using welded wire fabric in RCC.
 - 2.4 Mention the characteristics of plain bar, deformed bar and twisted bar and tendon.
 - 2.5 Mention the advantages of uses of deformed and twisted bar in RCC.
 - 2.6 State the minimum reinforcement used in RCC beam and slab.
- 3 Understand the concept of transformed section of beam.**
 - 3.1 Define transformed section.
 - 3.2 Explain the theory of transformed section with sketches.
 - 3.3 Express the derivation of the equation for investigating the stresses developed in concrete and steel by transformed section method.
 - 3.4 Calculate the stresses developed in rectangular beam and T-beam in WSD method.
 - 3.5 Explain balanced reinforced beam, under reinforced beam and over reinforced beam.
 - 3.6 Mention the effect of under reinforcement and over reinforcement in RCC beams.

- 4 Understand the shear stress developed in RCC beams.**
 - 4.1 Explain the effects of shear force and stress in RCC beams.
 - 4.2 State the meaning of diagonal tension.
 - 4.3 Explain the causes of creating diagonal tension in RCC beams.
 - 4.4 Express the derivation of the formula to determine shear stress developed in RCC beams.
 - 4.5 Solve the problems on shear stress developed in WSD method.
 - 4.6 Solve the problems on shear stress developed in USD method.
 - 4.7 Mention the allowable shear stress for RCC beam (v) and shear stress for concrete (v_c).
- 5 Understand the functions of web reinforcement in RCC beams.**
 - 5.1 Define web reinforcement.
 - 5.2 Classify web reinforcement with sketches.
 - 5.3 Mention the functions of web reinforcement in RCC beams.
 - 5.4 Determine the spacing of web reinforcement (vertical & inclined) in WSD method.
 - 5.5 Determine the spacing of web reinforcement in USD method.
 - 5.6 Determine the portion of the RCC beam requiring web reinforcement.
- 6 Understand the bond stress developed in RCC beams.**
 - 6.1 State the meaning of bond stress.
 - 6.2 Express the derivation of the formula to determine bond stress developed in RCC beams.
 - 6.3 State the allowable bond stress for plain bar and deformed bar in WSD and USD methods.
 - 6.4 Determine the anchorage length of reinforcement in RCC.
 - 6.5 Explain the necessity of standard hooks of reinforcement in RCC.
- 7 Understand the flexure formula and design of RCC rectangular beam in WSD method.**
 - 7.1 State the assumptions used in developing the flexure formula.
 - 7.2 Explain the stress diagram of a loaded RCC beam.
 - 7.3 Mention the notations used in flexure formula in WSD method.
 - 7.4 Express the derivation of the flexure formula for RCC beam in WSD method.
 - 7.5 Outline the design steps of RCC rectangular beam in WSD method.
 - 7.6 State the minimum spacing of reinforcing bars in RCC beam.
 - 7.7 Design a simply supported RCC rectangular beam in WSD method.
 - 7.8 Design a semi-continuous RCC rectangular beam in WSD method.
 - 7.9 Design a continuous RCC rectangular beam in WSD method.
- 8 Understand flexure formula and design of RCC rectangular beam in USD method.**
 - 8.1 Differentiate WSD and USD method.
 - 8.2 Explain the stress diagram of loaded beam with showing the actual & equivalent rectangular stress distribution of ultimate load.
 - 8.3 State the load and load factors used in USD method.
 - 8.4 Mention the notations used in flexure formula in USD method.
 - 8.5 Express the derivation of the flexure formula in USD method.
 - 8.6 Outline the design steps of RCC rectangular beam in USD method.
 - 8.7 Design a simply supported RCC rectangular beam in USD method.
 - 8.8 Design a semi-continuous RCC rectangular beam in USD method.
 - 8.9 Design a continuous RCC rectangular beam in USD method.
- 9 Understand the design of RCC cantilever & overhanging rectangular beams in WSD method.**
 - 9.1 Determine the design load, shear force and bending moment of RCC cantilever & overhanging beams.
 - 9.2 Design a cantilever RCC rectangular beam.

- 9.3 Design an overhanging RCC rectangular beam.
- 9.4 Describe the technique of curtailment of reinforcement in cantilever RCC beams.
- 10 Understand the T-beam and design of RCC T-beams**
- 10.1 Define T-beam.
- 10.2 Identify the different parts of a typical T-beam.
- 10.3 Determine the width of flange of T-beam considering span length and slab thickness.
- 10.4 State the ratio of width of web to the depth of web for T-beams.
- 10.5 Distinguish between RCC rectangular beam and T-beam.
- 10.6 Determine the depth and width of a simply supported T-beam in respect to shear force.
- 10.7 Outline the design steps of RCC T-beam in WSD method.
- 10.8 Design a simply supported RCC T-beam in WSD method.
- 10.9 Design a semi-continuous RCC T-beam in WSD method.
- 10.10 Design a continuous RCC T-beam in WSD method.
- 11 Understand the design of RCC beam with compression reinforcement.**
- 11.1 State the meaning of double reinforced beam.
- 11.2 Differentiate between RCC single and double reinforced beam.
- 11.3 Outline the design steps of double reinforced beam.
- 11.4 Design a simply supported double reinforced beam.
- 11.5 Design a semi-continuous double reinforced beam.
- 11.6 Design a continuous double reinforced beam.
- 12 Understand the design of RCC lintel over doors & windows.**
- 12.1 Determine the area of the wall to be considered in determining the design load for RCC lintels.
- 12.2 Outline the design steps of RCC lintel.
- 12.3 Design a RCC lintel over doors and windows.

Practical:

1. Perform compression test of concrete cylinder for particular proportion with different water-cement ratio.
2. Perform compression test of concrete cube for particular proportion with different water-cement ratio
3. Conduct tensile strength test of mild steel for plain bar of different diameters.
4. Conduct tensile strength test of mild steel for deformed bar of different diameters.
5. Prepare a model of simply supported RCC rectangular beam as per drawing.
6. Prepare a model of semi-continuous RCC rectangular beam as per drawing.
7. Prepare a model of continuous RCC rectangular beam as per drawing.
8. Prepare a model of double reinforced simply supported rectangular beam as per drawing.
9. Prepare a model of RCC lintel as per drawing.
10. Prepare a model of RCC lintel with sunshade as per drawing.

REFERENCE BOOKS

1. Simplified Design of Reinforced Concrete
-by H Parker
2. Design of Concrete Structures
-by G Winter, L C Urquhart, C E O'Rourke, A H Nilson
3. Treasure of R C C Designs
-by Sushil Kumar
4. R C C Design -by Abul Faraz Khan

66464

Civil Engineering Drawing-3 (CAD)

T P C
1 6 3

AIMS

To be able to develop knowledge, skill and attitude in the field of Civil Engineering Drawing with special emphasis on:

- Building Plan,
- detail drawing of staircase, Kitchen, Toilet
- Plumbing drawing, Electrical drawing,
- working drawing with Auto CAD
- Building Approval Sheet.
- Rendering ,
- Layout and Plotting.

SHORT DESCRIPTION

Plan of Residential building, Kitchen and Toilet details, Plumbing drawing, Electrical drawing, Culvert, T-Beam, 3D object, Details of door and window, Plotting, Rendering with Auto CAD.

DETAIL DESCRIPTION

Theory:

1. Understand the Auto CAD environments.

- 1.1 Explain How to starts Auto CAD software and identify the different areas of CAD graphic screen.
- 1.2 Describe the use menu bar, command window and toolbar.
- 1.3 Express the Cartesian co-ordinate system.
- 1.4 Explain how to save the drawing & exit from the file.

2. Understand the functions and uses of different CAD commands.

- 2.1 State the meaning of WCS icon and UCS icon.
- 2.2 Mention the classifications of co-ordinate system.
- 2.3 State the necessity of drawing units and limits.
- 2.4 Mention the functions of the following editing commands: copy, move, array, offset, trim, fillet, chamfer, extend, break, rotate, stretch, mirror, change, chprop, scale and pedit.
- 2.5 Mention the functions of the following object grouping commands: block, insert, explode, w block, divide, measure, purge, xref etc.
- 2.6 Mention the functions of the following enquiry commands: dist, area, Id, list etc.
- 2.7 Mention the functions of the following plotting commands: layout, view port, model space, paper space.
- 2.8 Mention the functions of the following dimension commands: dimension style, Ddim, leader, linear dimension, radius & diameter dimension, aligned dimension, continue dimension, base dimension etc.

2.9 Mention the functions of the following geometric commands: donut, solid, trace, pline, xline, ray, fill, hatch and text etc.

2.10 State the functions of Auto CAD design center (ADC).

3. Understand the preparation of plan, section, elevation and other components of multi-storied framed structure building using CAD.

3.1 Describe the process of drawing the site plan and layout plan of a multistoried framed structure building.

3.2 Describe the process of drawing the plan, elevation and sectional elevation of a multi-storied framed structure building.

3.3 Describe the process of making the detailed drawing of beam, roof slab and lintel of multi-storied building.

3.4 Describe the process of making the detailed drawing of staircase, lift core and ramp of multi-storied building.

3.5 Mention the advantages of making the necessary drawings of multistoried framed structure building using CAD.

4. Understand the drawing about 3D using Auto CAD.

4.1 Explain about starting 3D.

4.2 Explain how to create 3D objects / model.

4.3 Explain how to draw isometric view.

4.4 Explain about Edgesurf, Rulesurf, Tabsurf & Mesh.

4.5 Explain the uses of Co-ordinate system in Auto CAD.

4.6 Explain how to create surface modeling.

4.7 Explain the use of 3D editing commands.

5. Understand the perspective view with rendering lighting & imaging in Auto CAD.

5.1 Explain how to creating perspective view.

5.2 Describe the use of distance and camera in perspective view.

5.3 Describe the rendering and materials effect in 3D.

5.4 Describe the uses & set up of background in 3D.

5.5 Describe the lighting & shadow in 3D.

5.6 Describe the uses of showing images in 3D.

5.7 Explain how to print 3D view.

6 Understand the Layout and plot the drawing.

6.1 Define layout for plot/print using paper space and model space.

6.2 State the scale & assign pen (if necessary) for plot/print.

6.3 Describe the paper & plotter for plotting/printing.

6.4 Describe the process of Plot/Print the drawing.

6.5 Discuss about various drawing in different scale in a paper through layout.

6.6 Describe the process of drawing in PDF format.

Practical:

1. Set up the drawing environments.

1.1 Start CAD software and identify the different areas of CAD graphic screen.

1.2 Use menu bar, command window and toolbar.

1.3 Perform the Cartesian co-ordinate system.

1.4 Save the drawing & exit from the file.

2. Construct the floor plan of a single unit residential flat(120 sqm).

- 2.1. Draw the floor plan in 1:50 scale of a 3- bedroom house.
- 2.2. Show the inside and outside detail dimension in the drawn plan (1.1).
- 2.3. Draw Front and side elevation (minimum one) in 1:50 scale of the 2- bedroom house
- 2.4. Draw section in 1:50 scale of the 3- bedroom house showing all dimension and material symbol.
- 2.5. Draw dining, drawing, kitchen, toilet etc. using above scale.
- 2.6. Make a finish schedule of the residence.

3. Construct the detail drawing of a Staircase.

- 3.1. Draw the detail ground floor plan of a doglegged staircase in 1:50 scale.
- 3.2. Draw the detail typical floor plan of a doglegged staircase in 1:50 scale.
- 3.3. Draw the section of the doglegged staircase in 1:50 scale with dimension.
- 3.4. Draw the detail of steps, nosing, handrail etc. of the staircase.
- 3.5. Draw the detail plan & section of a three quarter stair in 1:50 scale with dimension.

4. Construct the detail drawing of a Kitchen.

- 4.1. Draw the kitchen plan in 1:20 scale of the 3- bedroom house (1.1).
- 4.2. Draw the kitchen fixtures in 1:20 scale on the drawn plan (3.1).
- 4.3. Draw two detail section of the kitchen through sink & burner/range in 1:20 scale showing all dimension.
- 4.4. Draw the cabinet detail showing all dimensions.

5. Construct the detail drawing of a Toilet.

- 5.1. Draw a master bath plan in 1:20 scale showing fixtures (Cabinet Basin, Bathtub, W.C. etc.) with all dimensions.
- 5.2. Draw the detail section of the master bath in 1:20 scale showing maximum fixtures and all dimensions.
- 5.3. Draw the toilet/bath plan in 1:20 scale showing fixtures (Basin, Shower tray, Long Pan/Indian Pan etc.) with all dimensions.

- 5.4. Draw the detail section of the toilet in 1:20 scale showing maximum fixtures and all dimensions.

6. Prepare various type of water supply fittings and fixtures.

- 6.1. Draw the various diameter water supply pipe.
- 6.2. Draw various diameter pipes for drainage water.
- 6.3. Draw various types of fittings using water supply and sanitation.
- 6.4. Draw various types of fixtures using water supply and sanitation.

7. Prepare a complete plumbing drawing by using Auto CAD.

- 7.1. Draw water supply and sewage pipe line as per layout.
- 7.2. Draw the plumbing fixtures & fittings on the floor plan.
- 7.3. Make a legend of electrical fixture & fittings.

8. Prepare the electrical drawing set with Auto CAD.

- 8.1. Make a layer for electrical layout of floor plan.
- 8.2. Draw the electrical fixtures & fittings on the floor plan.
- 8.3. Make a layer for electrical layout of floor plan.
- 8.4. Draw the electrical fixtures & fittings on the floor plan.
- 8.5. Make a legend of electrical fixture & fittings.
- 8.6. Draw circuit diagram of the floor plan.

9. Prepare detailed drawing of two span box culvert using CAD.

- 9.1. Draw the sectional plan of a two span RCC box culvert.
- 9.2. Draw the cross section of a two span RCC box culvert.
- 9.3. Draw the long section of a two span RCC box culvert.
- 9.4. Show the long section arrangement in the decking of the two spans RCC box culvert.

10. Prepare detailed drawing of T-beam decking bridge using CAD.

- 10.1 Draw a half top plan and half plan (decking and earth removed) of RCC T-beam decking bridge with splayed type wing wall.
- 10.2 Draw a sectional elevation of RCC T-beam decking bridge.
- 10.3 Draw the cross section of RCC T-beam decking bridge showing the reinforcement.
- 10.4 Show the details of T-beam of RCC T-beam bridge.
- 10.5 Show the details of wing wall, turn wall, railing and bed block of RCC T-beam bridge.

11. Prepare the drawing with steel truss using CAD.

- 11.1 Draw a drawing of steel truss for factory.
- 11.2 Draw a drawing of steel truss with simple building.

12. Prepare the 3D objects using CAD.

- 12.1 Create simple 3D object in auto CAD.
- 12.2 Draw isometric view.
- 12.3 Create 3D surface by using 3D poly, Edge surf, Rule surf, Tab surf & Mesh.
- 12.4 Edit / draw 3D object using polar co-ordinate system.
- 12.5 Edit 3D object using different editing command i. e. align, 3D rotate, 3Darray 3D, mirror, 3D, move, chamfer, fillet, trim etc.

13. Modify/Edit the 3D objects using CAD.

- 13.1 Create 3D surface/object by using extrude.
- 13.2 Edit 3d object using union command
- 13.3 Draw 3d object using revolves command.
- 13.4 Edit / draw 3D object using intersect command.
- 13.5 Edit 3D object using subtracts command.

14. Prepare working drawing of paneled & flush door.

- 14.1 Draw the plan of wooden paneled door in scale 1:20
- 14.2 Draw the elevation & section of paneled door in scale 1:20
- 14.3 Draw the plan of wooden flush door in scale 1:20
- 14.4 Draw the elevation & section of flush door in scale 1:20
- 14.5 Draw the plan of wooden glazed door in scale 1:20
- 14.6 Draw the elevation & section of glazed door in scale 1:20

15. Prepare detail drawing of wooden door.

- 15.1 Draw detail section of wooden frame/chowkat in scale 1:20
- 15.2 Draw detail section of wooden paneled door and shutter in scale 1:20
- 15.3 Draw detail of flush door in scale 1:20
- 15.4 Draw detail of glazed door in scale 1:20

16. Prepare working drawing of Aluminum sliding door.

- 16.1 Draw the plan of Aluminum sliding door in scale 1:20
- 16.2 Draw the elevation & section of Aluminum sliding door in scale 1:20
- 16.3 Draw the plan of Aluminum swing door in scale 1:20
- 16.4 Draw the elevation & section Aluminum swing door in scale 1:20

17. Prepare working drawing of wooden window.

- 17.1 Draw the plan of wooden glazed window (scale 1:20)
- 17.2 Draw the elevation & section of wooden glazed window (scale 1:20)
- 17.3 Draw the plan of steel glazed window (scale 1:20)
- 17.4 Draw the elevation & section of steel window (scale 1:20)
- 17.5 Draw plan & elevation of pivoted window (scale 1:20)

18. Set the Layout and plot the drawing.

- 18.1 Create layout for plot/print using paper space and model space.
- 18.2 Set up the scale & assign pen (if necessary) for plot/print.
- 18.3 Select the paper & plotter for plotting/printing.
- 18.4 Plot/Print the drawing.
- 18.5 Set various drawing in different scale in a paper through layout.
- 18.6 Save the drawing in PDF format.

19. Perform the preparation of the perspective view with rendering lighting & imaging in Auto CAD.

- 19.1 Set the distance create perspective view.
- 19.2 Set the camera to draw the perspective view.
- 19.3 Draw perspective view of an object using 3D view command.
- 19.4 Set the material from material library for rendering.
- 19.5 Set the background color / image for rendering.
- 19.6 Set the light & create shadow using different command.
- 19.7 Draw perspective view of an object with full rendering.

20. Prepare a building model by using 3D.

- 20.1 Fix up the door & window in the model
- 20.2 Add roof slab over the wall
- 20.3 Fix up all necessary elements of mode
- 20.3 Beautification the model
- 20.5 Run the model

REFERENCE BOOKS:

- 1. Internet source
 - 2. Working Drawing - I – BTEB
 - 3. Time Saver Standard- Building Type
 - 4. Auto CAD - Samuel A Mallick
- Engr. Md. Shah Alam

66561

Design & Drawing of Furniture-II

T P C
1 6 3

AIMS

- to basic concept wood working drawing To be able
- to develop skills and attitude in design and drawing of furniture. To be able
- to develop skills and attitude of performing various furniture. To be able
- To be able to perform pictorial drawing of simple wooden furniture. To be able
- to understand basic concept of ArtCAM Software To be able

SHORT DESCRIPTION

Basic concept wood working drawing, pictorial drawing of simple wooden furniture, working drawing of furniture, wood working design, basic concept of ArtCAM Software, Geometrical models and modeling techniques, formula of round log and calculate quantity of round log, volume of timber in cubic feet and cubic meter.

DETAIL DESCRIPTION

Theory:

1. Understanding the basic concept wood working drawing.

- 1.1 State the free hand sketch.
- 1.2 Mention the free hand sketch materials.
- 1.3 Describe the free hand sketch materials.
- 1.4 Describe the advantages and disadvantages of free hand sketch.
- 1.5 Describe the working drawing of furniture.
- 1.6 Importance of working drawing of furniture.

2. Prepare pictorial drawing of simple wooden furniture.

- 2.1 Identify the one point projection.
- 2.2 Identify the ground and horizontal line of projection.
- 2.3 Draw an object by one point perspective.
- 2.4 Draw two points perspective projection.
- 2.5 Identify the eye level and vanishing point.
- 2.6 Identify the visible area of object, height and top views of object.
- 2.7 Draw an object by two point perspective.

3. Perform the wood working design.

- 3.1 Identify modern and classical design.
- 3.2 Make various types of design in wood works.
- 3.3 Identify the ornamentation in wood working design.
- 3.4 Prepare various popular design of ornamentation in wood works.
- 3.5 Identify the inlaying work.
- 3.6 Identify various types of molding in wood works.

4. Understand basic concept of ArtCAM Software.

- 4.1 Define ArtCAM.
- 4.2 Discuss the role of ArtCAM
- 4.3 Describe elements of ArtCAM system.
- 4.4 Discuss the advantages and application of ArtCAM software.
- 4.5 Discuss co-ordinate system in ArtCAM.
- 4.6 Describe the relation between AutoCAD & ArtCAM.

5 Understand Geometrical models and modeling techniques.

- 5.1 Define Geometrical solid models.
- 5.2 Describe 2-D & 3-D model technique and dimension transformation.
- 5.3 Explain the terms: Layer, Colors, Grids, Groups, Dragging, Clipping and transformation.
- 5.4 Describe modify, annotations, blocks, inserts, hatches, layouts and template commands.
- 5.5 Explaining View sets, Virtual realism.
- 5.6 Discuss surface modeling- Analytical and Synthetic approaches
- 5.7 Describe Design process by using ArtCAM software.

7. State the formula of round log and calculate quantity of round log.

8. Find out the volume of timber in cubic feet and cubic meter.

9. Calculate running feet & running meter from different cross sectional volume of timber.

Practical:

1. Draw geometrical involving line, arc, and circle in two-dimensional environment.
2. Draw geometrical involving lines, curves, circle, ellipse, with given data.
3. Perform the given drawing with text and dimensions.
4. Draw a 3-D object using solid model technique.
5. Draw a 3-D object using constructive geometric technique.
6. Prepare working drawing of reading table using Auto CAD.
7. Prepare working drawing of bed using Auto CAD.
8. Prepare Working Drawing of Living room furniture(any one) by using AutoCAD
9. Prepare Working Drawing of dining room furniture (any one) by using AutoCAD
10. Prepare Working Drawing of bed room furniture (any one) by using AutoCAD
11. Prepare Working Drawing of kitchen room furniture (any one) by using AutoCAD
12. Prepare Working Drawing of office room furniture (any one) by using AutoCAD
13. Prepare Working Drawing of cafeteria furniture (any one) by using AutoCAD
14. Prepare Working Drawing of hotel room furniture (any one) by using AutoCAD
15. Prepare Working Drawing of reception room furniture (any one) by using AutoCAD

Reference book:

- 1.Principles of wood working by HermanHyorth.
- 2.Modern wood working by Willis H.Wagner.
- 3.Wood working Technology by Hammond Donnelly/Harrod Rayner.
- 4.Wood working drawing by BTEB

AIMS

- *To be able to acquire knowledge and skills of seasoning timber.*
- *To be able to season timber in natural and artificial process.*
- *To be able to run a modern seasoning plant.*
- *To be able to acquire knowledge and skills of wood treatment.*
- *To be able to acquire knowledge and skills about raw and finishing materials.*
- *To be able to acquire knowledge and skills about proper selection of raw and finishing materials.*
- *To be able to understand about wood filler and bleaches.*
- *To be able to understand about wood putty, varnish, lacquer and sealer.*

SHORT DESCRIPTION

Seasoning of timber, natural seasoning, artificial seasoning, shrinkage and swelling, drying schedule and humidity, preservative, method of treatment, timber structure, substitute of wood, market from of timber, abrasives, fastening, wood filler, sealer, stain, varnish and lacquer.

DETAIL DESCRIPTION

Theory:

1. Understand the seasoning of timber.

- 1.1 Define seasoning.*
- 1.2 Classification of seasoning.*
- 1.3 State purposes of seasoning.*
- 1.4 Describe the techniques of stacking.*
- 1.5 Describe the methods of loading and unloading trolley.*

2. Understand the process of natural seasoning.

- 2.1 Explain the process of air seasoning.*
- 2.2 Classification of air seasoning.*
- 2.3 Describe the process of solar seasoning.*
- 2.4 Classification of solar seasoning.*
- 2.5 Mention the advantages and disadvantages of air and solar seasoning.*

3. Understand the process of artificial seasoning.

- 3.1 Describe the process of artificial seasoning.*
- 3.2 Define kiln seasoning.*
- 3.3 Describe the relative air humidity and air circulation.*
- 3.4 Mention the temperature to be maintained for artificial seasoning.*
- 3.5 Explain moisture content of timber.*
- 3.6 Explain high frequency seasoning method.*

4. Understand shrinkage and swelling of timber.

- 4.1 Describe the effect of shrinkage with neat sketches.*
- 4.2 Describe the radial, tangential and longitudinal shrinkage with sketches.*
- 4.3 Explain swelling of timber.*
- 4.4 Mention the fiber saturated point.*
- 4.5 Describe the seasonal effect of timber.*

5. Understand drying schedule and humidity.

- 5.1 Define drying schedule*
- 5.2 Mention the uses of drying schedule.*
- 5.3 Describe the method to prepare drying schedule.*
- 5.4 Define absolute air humidity.*

5.5 Describe the drying schedule of different timber prepared by Bangladesh Forest Research Institute (BFRI).

6. Understand the natural method of treatment and preservatives of wood.

- 6.1 Describe classification of treatment process.
- 6.2 Describe the water treatment process.
- 6.3 Describe the surface treatment process.
- 6.4 Define preservatives.
- 6.5 Describe classification of wood preservatives.
- 6.6 Describe the application of wood preservatives.

7. Understand the market form of timber and conversion logs.

- 7.1 Define the market form of timber.
- 7.2 Describe different standards of market form of timber.
- 7.3 Mention the advantages of market form timber.
- 7.4 State the meaning of conversion of logs.
- 7.5 Mention the different types of conversion of logs.
- 7.6 Mention the economic value of conversion of logs.

8. Understand the raw materials used by the forest based industries.

- 8.1 List out the raw materials used by the forest based industries.
- 8.3 How to use agro waste as a raw material of forest product.
- 8.4 List out the non-durable timber.
- 8.5 Mention the preservatives used to enhance the life of non-durable timber.
- 8.5 Necessity of enhancing the life of non-durable timber.

9. Understanding adhesion and adhesives for wood.

- 9.1 State physical and chemical principles of gluing.
- 9.2 Identify and classify adhesives.
- 9.3 Describe the use of following adhesives. (PVA, RUBBER ADHESIVE, HOT MELT GLUE, SUPER GLUE)
- 9.4 Describe the influences of temperature and moisture content on the strength of glue joints.
- 9.5 State pre-treatment of wood prior to gluing.
- 9.6 Describe the process of gluing.
- 9.7 State difficulties and defects in gluing.

10. Understand the characteristics and properties of different types of wood.

- 10.1 Define hard wood and soft wood.
- 10.2 List out the hard and local soft wood.
- 10.3 Difference between hard and local soft wood.
- 10.4 Mention the physical characteristics and properties of different kinds of wood.
- 10.5 Mention the mechanical characteristics and properties of different kinds of wood.

11. Understand the substitute of wood.

- 11.1 Define the substitute of wood.
- 11.2 Identify various types of substitute of wood.
- 11.3 Explain the uses of various substitute of wood.
- 11.4 Define laminated board, hard board, Veneered Board, Ply wood, MFC (Melamine faced chip board), Medium density fiber board (MDF), HDF (High density fiber board) chip board, HPL (High pressure laminate), PVC sheet, plastic wood, bamboo and cane.
- 11.5 Define and classify the Resins for manufacturing boards.

12. Understand wood finishing method.

- 12.1 Describe sand paper, emery paper and steel wool.
- 12.2 Mention the uses of sand paper, emery paper and steel wool.
- 12.3 Describe wood putty and method of applying putty.
- 12.4 Identify the finishing equipment.
- 12.5 Describe wood fillers and method of applying wood fillers.

13. Understand the necessity of lacquer finishing wood works.

13.1 Define lacquer.

13.2 Explain the necessity of lacquer finish in wood works.

13.3 Mention the lacquer polish materials in wood works.

13.4 How check the quality of thinner, sealer, lacquer and lacquer related other materials.

13.5 Mention the advantages and disadvantages of using lacquer polish in wood works.

13.6 Describe the process of lacquer polish in wood works.

PRACTICAL:

- 1. Draw a cross section of a hard/soft wood and mentioned their name.*
- 2. Perform the stacking of timber.*
- 3. Perform any one process of natural seasoning.*
- 4. Perform any one process of artificial seasoning.*
- 5. Perform any one process of natural treatment.*
- 6. Perform any one process of artificial treatment.*
- 7. Perform the physical properties of wood.*
- 8. Perform the mechanical properties of wood.*
- 9. Perform the physical properties of different types of substitute of wood.*
- 10. Perform a project using lacquer finishing materials.*

REFERENCE BOOK:

- 1. Principles of wood working by Herman Hyorth.*
- 2. Principles of wood science & technology by Kollmann/Kuenzi/Stamm*
- 3. Applied wood preservation by Arun Kumar Lahiry.*

66563 Wood Working Machine & Tools T P C

2 3 3

AIMS:

- To be able to identify different types of hand tools.
- To be able to developing knowledge and skills about modern tools and equipment.
- To be able to develop skills and attitude in operating system of wood working machine.
- To be able to develop skill and attitude of safe machine operation.
- To be able to adjust machine with safety manner.

SHORT DESCRIPTION:

Different types of wood working hand tools, wood working machine, safety rules, saw machine, drill machine, knot boring machine, hollow chisel mortise, chain mortise, jointer planer, belt sander; CNC router machine, dovetail machine, lathe machine, universal wood machine, compressor, spraying equipment, veneer press, peeling machine, slicing machine, spindle molder, thicknesses planner, Tenon machine, grinding machine, grinding stone, band saw machine and band saw brazing machine.

DETAIL DESCRIPTION:

Theory:

1. Understand the basic concept of wood working machine and tools

- 1.1 Classify the wood working hand tools according to their uses.
- 1.2 Describe the different pneumatic tools (Nail gun, stapler gun, screwdriver, drill etc.).
- 1.3 Mention the purpose of machines used in wood work.
- 1.4 Classify wood working machines.
- 1.5 Mention the advantages of wood working machines.
- 1.6 Mention the general safety rules in woodshop.

2. Understand the saw machine and its classification.

- 2.1 Mention the safety rules in using saw machine.
- 2.2 Mention the functions of main parts of a circular saw machine.
- 2.3 Describe the process of cross cutting and ripping with a circular saw machine.
- 2.4 Mention the functions of main parts of a dimension saw machine.
- 2.5 Describe the size of blades and angle of teeth of a circular saw machine.
- 2.6 Mention the uses of band saw machine.
- 2.7 Describe the size of blades and angle of teeth of band saw.
- 2.8 Mention the uses of jig saw machine.
- 2.9 Mention the uses of panel saw machine.

3. Understand the thickness planer machine and jointer planer machine.

- 3.1 Identify the different parts of a jointer planer machine.
- 3.2 State the use of jointer planer machine.
- 3.3 Identify the different parts of a thickness planer machine.
- 3.4 Describe the operating system of a thickness planer machine.
- 3.5 Mention the maintenance process of jointer planer and thickness planer machine.

4. Understand the spindle molder machine.

- 4.1 Identify the different parts of a spindle molder machine.
- 4.2 Describe the operating system of spindle molder machine.

- 4.3 Describe the cutters and other accessories of spindle molder machine.
- 4.4 Describe the maintenance process of spindle molder machine.
- 4.5 Describe the sharpening of molding cutter.

5. Understand CNC machine.

- 5.1 Define of CNC machine.
- 5.2 Classification of CNC machine.
- 5.3 Describe the tools & equipments of CNC Machine.
- 5.4 Mention the parts of CNC machine.
- 5.5 List out the name of CNC machine bit.
- 5.6 Mention the uses of CNC machine.
- 5.7 Describe the operating software of CNC machine.

6. Understand mortise, tenon and dovetail machine.

- 6.1 Identify the different parts of a hollow chisel mortise machine.
- 6.2 Identify the different parts of a chain mortise machine.
- 6.3 Identify the different parts of a tenon machine.
- 6.4 Identify the different parts of a dovetail machine
- 6.5 Describe the process of sharpening a cutter.
- 6.6 Describe the function of mortise, tenon and dovetail machine.

7. Understand the belt sander machine and its uses.

- 7.1 Identify the different parts of a belt sander machine.
- 7.2 State the grades of sand paper used in a belt sander machine.
- 7.3 Describe the process of sanding with belt sander machine.
- 7.4 Describe the function of belt sander machine.
- 7.5 Describe the maintenance of belt sander machine.

8. Understand the lathe and grinding machine.

- 8.1 Identify the different parts of a lathe machine.
- 8.2 Describe the operating system of lathe machine.
- 8.3 State the maintenance process of lathe machine.
- 8.4 Define grinding stone.
- 8.5 Describe grain size and grade of grinding stone.
- 8.6 Identify different parts of grinding machine.
- 8.7 Describe the operating system of grinding machine.

9. Understand the peeling machine, slicing machine and veneer press machine.

- 9.1 Describe the uses of peeling machine.
- 9.2 Describe the operating system of peeling machine.
- 9.3 Describe the uses of slicing machine.
- 9.4 Describe the operating system of slicing machine.
- 9.5 Describe the uses of veneer press machine.
- 9.6 Describe the operating system of veneer press machine.

10. Understand the compressor machine and spraying equipment.

- 10.1 Describe the uses of compressor machine.
- 10.2 Mention the classification of compressor machine.
- 10.3 Describe the operating system of compressor machine.
- 10.4 Describe the use of compress air.
- 10.5 Identify the different parts of spray gun.
- 10.6 Describe the method of painting using spray gun.

10.7 Describe the cleaning process of spray gun.

11. Understand the band saw brazing machine.

11.1 Describe the uses of saw brazing machine.

11.2 Identify the different parts of band saw brazing machine.

11.3 Describe the operating system of band saw brazing machine.

11.4 Mention the advantages and disadvantages of brazing a blade.

11.5 Describe the maintenance of band saw blade.

12. Understand the edge bender and multi boring machine.

12.1 Identify the different parts of edge bender machine.

12.2 Describe the operating system of edge bender machine.

12.3 Identify the different parts of multi boring machine.

12.4 Describe the operating system of multi boring machine.

12.5 Describe the uses of edge bender machine and multi boring machine.

Practical:

1. Perform the identification of various types of hand tools used in woodworking.

1.1 Identify measuring, marking and cutting tools.

1.2 Identify different handsaws.

1.3 Identify different hand planes.

1.4 Identify different chisels.

1.5 Identify different holding and helping tools.

2. Perform the operation of saw machine.

2.1 Cut a piece of wood with a circular saw machine.

2.2 Assemble and disassemble a circular saw blade.

2.3 Cut a piece of wood with a band saw machine.

2.4 Assemble and disassemble a band saw blade.

2.5 Cut a piece of wood with a jig saw machine.

3. Perform the operation of hollow chisel mortise and chain mortise machine.

3.1 Make a mortise with hollow chisel mortise machine.

3.2 Sharp the bit of a hollow chisel mortise machine.

3.3 Make a mortise with chain mortise machine.

4. Perform the operation of jointer planer machine.

4.1 Cut a stop chamfer of a piece of wood.

4.2 Grind the blade of jointer planer machine.

4.3 Adjust the fence of a jointer planer machine.

4.4 Adjust the out feed table of a jointer planer machine.

5. Perform the operation of CNC machine.

5.1 Select the required size of bit for a CNC machine.

5.2 Make housing joint with a CNC machine.

5.3 Cut a rabbit with a CNC machine.

5.4 Make a logo of DTE/BTEB using CNC machine.

6. Perform the operation of wood working lathe machine.

- 6.1 Turn a roller using wood working lathe machine.
- 6.2 Cut a piece of wood in the following shape:
 - a. V- shape
 - b. Different types of ornamental curves
- 6.3 Turn a block with the help of face plate.

7. Perform the operation of spraying equipment.

- 7.1 Identify the functions of spraying equipment.
- 7.2 Paint a furniture using spray gun.
- 7.3 Perform the cleaning of spray gun.

8. Perform the operation of spindle molder machine.

- 8.1 Mould the edge of a board using spindle molder machine.
- 8.2 Mould a curve edge using spindle molder machine.

9. Perform the operation of thickness planer machine.

- 9.1 Plane a wood piece using thickness planer machine.
- 9.2 Sharp the blade of a thickness planer machine.
- 9.3 Perform maintenance of thickness planer machine.

10. Perform the operation of tenon machine.

- 10.1 Set the cutters of a tenon machine.
- 10.2 Make a tenon using tenon machine.
- 10.3 Grind the blades of tenon machine.

Reference book:

- 1. Wood working machine-2 by BTEB
- 2. Wood working for industry (Third edition) by John L. Feirer

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 Discuss the motivation theory of Maslow and Herzberg.
- 6.5 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 ভট্টাচার্য-ব্যবস্থাপনা এর মৌলিক ধারণা, ব্যতিক্রম প্রকাশনী ঢাকা। Matz Usry-Cost Accounting: Planning & Control.