



BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207

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

CIVIL TECHNOLOGY
TECHNOLOGY CODE: 664

6th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CIVIL TECHNOLOGY (664)

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	66461	Advance Surveying	2	6	4	40	60	50	50	200
2	66462	Transportation Engineering-1	2	3	3	40	60	25	25	150
3	66463	Design of Structure-1	2	3	3	40	60	25	25	150
4	66464	Civil Engineering Drawing -3 (CAD)	1	6	3	20	30	50	50	150
5	66465	Foundation Engineering	2	3	3	40	60	25	25	150
6	66466	Civil Engineering Software	0	3	1	0	0	25	25	50
7	65852	Industrial Management	2	0	2	40	60	0	0	100
Total			11	24	19	220	330	200	200	950

66461

Advanced Surveying

T P C
2 6 4

AIMS

- To be able to understand Field Astronomy.
- To be able to determine latitude and longitude of a place.
- To be able to learn using digital theodolite and total station.
- To be able to learn global positioning system (GPS).
- To be able to learn Geographic Information Systems(GIS)
- To be able to learn about geodetic control points.
- To be able to understand RTK.

SHORT DESCRIPTION

Field astronomy; Digital Theodolite; Total station; Global positioning system (GPS); Geographic Information Systems (GIS), geodetic control points, RTK.

DETAIL DESCRIPTION

Theory:

1 Understand field astronomy.

1.1 State the astronomical terms: Spherical trigonometry, Small circle, Great circle, Celestial sphere, Zenith, Nadir, Celestial horizon, Visible horizon, Polar equator, Polar axis, Celestial equator, Celestial poles, Prime vertical, Ecliptic, Nautical mile, Altitude and azimuth, Declination and Right ascension, Declination and Hour angle, Culmination, Circumpolar star, Astronomical triangle, Spherical triangle, Spherical excess, Polaris, Meridian, Azimuth, latitude and longitude.

- 1.2 Determine the length of a great circle arc.
- 1.3 Determine the length of a small circle arc.
- 1.4 Mention the properties of a spherical triangle.
- 1.5 State the altitude and azimuth system.
- 1.6 State the declination and hour angle system.
- 1.7 State the declination and right ascension.

2 Understand different types of time.

- 2.1 State the terms: Sidereal time, apparent solar time, Mean solar time, Local time, Local mean time, Green witch mean time and Standard time.
- 2.2 Describe the equation of time.
- 2.3 Convert standard time to local mean time and vice versa.
- 2.4 Convert local time to Greenwich Mean Time and vice versa.
- 2.5 Solve problem on Conversion of time.

3 Understand the digital theodolite.

- 3.1 Define digital theodolite.
- 3.1 Compare digital theodolite with others.
- 3.3 Describe the components of digital theodolite and its function.
- 3.5 Describe the procedure of setting digital theodolite.
- 3.6 Describe the procedure of measuring horizontal angle with digital theodolite.
- 3.6 Describe the procedure of measuring vertical angle with digital theodolite.
- 3.7 Explain the procedure of measuring magnetic bearing of a line.

4 Understand the principle of operation and uses of total station.

- 4.1 Explain the function of the total station.
- 4.2 State focusing and target point of total station.
- 4.3 Describe the procedural steps of setting total station.
- 4.4 Mention the precaution for using total station.
- 4.5 Mention the procedure of centering and leveling.

5 Understand distance and co-ordinates measurement with total station.

- 5.1 Describe the procedure of EDM setting in the total station.
- 5.2 Describe the procedure of measuring horizontal distance and slop distance with total station.
- 5.3 Describe the procedure of measuring vertical distance with total station.
- 5.5 Explain 3-D co-ordinates.
- 5.6 State the procedure of entering instrument station data.
- 5.6 Mention the procedure of azimuth angle setting.
- 5.7 Describe the procedure of 3-D co-ordinates measurement.

6 Understand resection measurement and setting out measurement.

- 6.5 Explain co-ordinates resection measurement.
- 6.6 Describe height resection measurement.
- 6.7 Explain distance setting out measurement.
- 6.8 Explain co-ordinates setting out measurement.
- 6.9 Describe remote elevation measurement (REM) and setting out measurement.

7 Understand the concept of Geodetic surveying.

- 7.1 Define Geodetic surveying.
- 7.2 Explain the purpose of Geodetic surveying.
- 7.3 Define geodetic control point.
- 7.4 Explain horizontal and vertical control points.
- 7.5 Identify the Standard Geodetic datum in the World.
- 7.6 State GCS (Geographic Coordinate System) .
- 7.7 Define UTM (Universal Transverse Mercator) System.
- 7.8 Using Geographic Tools (Coordinate Conversion / Datum Transformation)
- 7.9 Convert GCS to UTM and vise-versa.
- 7.10 Define BUTM (Bangladesh Universal Transverse Mercator) System.

8 Understand the principles of operation and uses of GPS receiver.

- 8.1 Explain Global Positioning System (GPS).
- 8.2 Describe the working principles of GPS receiver.
- 8.3 Mention different features of GPS receiver.
- 8.4 Describe operational process of the instruments related to GPS.
- 8.5 Describe the procedure of finding co-ordinates of a station using GPS receiver.
- 8.6 List the works performed by GPS receiver.
- 8.7 Mention different types of software used in GPS receiver.
- 8.8 Describe the preparation of a map using mapping software and data received with GPS receiver.
- 8.9 To locate a geodetic position in a project area using GNSS Receiver.

9 Understand the principles of Geographic Information System (GIS)

- 9.1 Explain Geographic Information System (GIS).
- 9.2 Describe advantages of GIS.
- 9.3 Mention Major application of GIS.
- 9.4 Describe Basic functions of GIS.
- 9.5 Explain GIS data model.
- 9.6 Describe different source of geographic data.
- 9.7 Mention different Methods of data capture.
- 9.8 Define Spatial Database
- 9.9 Describe Database management system.

10 Understand the concept of GIS Map.

- 10.1 Mention different types of GIS software.
- 10.2 Describe required hardware and software for GIS.
- 10.3 Install Arc Map software and identify different working tools.
- 10.4 Prepare a Base Map showing all features in standard GIS format.
- 10.5 Prepare a Contour map showing all existing /proposed Infrastructure in GIS Environment.
- 10.6 Prepare a DEM Map showing all existing /proposed Infrastructure in GIS format.
- 10.7 Prepare a KMZ file of all features should be overlaid on Google image.
- 10.8 Collect all views of Picture in existing features in different modes.
- 10.9 Describe the procedure of plotting map in the computer.

11 Understand the concept of Real-Time Kinematic(RTK) Surveying.

- 11.1 Define Real-Time Kinematic(RTK) Surveying.
- 11.2 Mention the objectives of RTK surveying.
- 11.3 Describe advantages of RTK surveying.
- 11.4 Mention the components of RTK system.
- 11.5 Describe the the procedure of setting up a base station.
- 11.6 Describe the procedure of setting up of rover.
- 11.7 Perform GPS survey using RTK system.

Practical:

1. Determine the height and distance of a tower using digital theodolite.
2. Perform temporary and permanent adjustment of total station.
3. Determine height and distance of tower using total station.
4. Determine the width of Road/ River/Lake with total station.
5. Perform co-ordinate setting and back sighting of Total Station of several points.
6. Conduct a Digital Topographic Survey with total station in your own Institution and plot maps including computation of areas.
7. Plot a Topographical survey map with the help of plotter/printer using different scale.
8. Perform layout plan of a high-rise Building including pile, pile cap, grid line, column etc.
9. Measure the latitude and longitude of a place in your Institution using GPS receiver.
10. Observe your speed, distance and time to reach your destination and find the Latitude and longitude of the place.
11. Conduct a geodetic survey using GPS receiver and plot maps including computation of areas.

12. Prepare a Base Map showing all features in standard GIS format.
13. Prepare a Contour map showing all existing /proposed Infrastructure in GIS Environment.
14. Prepare a DEM Map showing all existing /proposed Infrastructure in GIS format.
15. Prepare a KMZ file of all features should be overlaid on Google image.
16. Plot all the views of map in different scale with plotter/ printer.
17. Find out geodetic control points using Google search and show horizontal & vertical control points.
18. To locate a geodetic position in Google Maps and add label of the target places.
19. Transfer a SOB BM using leveling operation in a project area and mark position of T BM on a pillar.
20. Perform GPS survey using RTK system

REFERENCE BOOKS

2. Advance Surveying - Natarajan
3. Surveying (Volume-2) - Dr. B.C. Punmia
4. A Text Book of surveying - Aziz & Shahjahan.
5. A Text Book of surveying (Volume-II) - P.B. Shahani
6. Manual SOKIA total station
7. Murai, S. (1999) GIS work book Japan Association of Surveyors (JAS),
1-3-4 Koishigawa, Bunkyo-Ku, Tokyo 112, Japan
Advance Surveying -by SatheeshGopi, R.Sathikumar, N.Madhu
GPS for land surveyors - by Jan Van Sickle

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

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

AIMS

- To be able to understand the foundation and foundation engineering.
- To be able to understand the soil stabilization.
- To be able to understand and the bearing capacity of soil.
- To be able to understand the factors determining types of foundation.
- To be able to understand the foundation on sand and non-plastic soil, plastic soil, non-uniform soil, rock.
- To be able to understand the excavating and bracing.
- To be able to understand the sheet pile wall, cofferdam and bulk head.
- To be able to understand the damages due to construction operations.

SHORT DESCRIPTION

Foundation and foundation engineering; Factors determining the types of foundation; Soil stabilization; Bearing capacity of soil; Foundation on sand and non-plastic silt; Foundation on clay and plastic silt; Foundation on non-uniform soil; Foundation on rock; Excavation and bracing; Sheet pile, cofferdam & bulkhead; Damages due to construction operations.

DETAIL DESCRIPTION**Theory:****1 Understand the foundation, foundation engineering and the factors determining types of foundation.**

- 1.1 State the meaning of foundation and foundation engineering.
- 1.2 Mention the requirements of a satisfactory foundation.
- 1.3 Mention the classification of foundation.
- 1.4 Mention the factors governing the depth of foundation.
- 1.5 Explain the steps in choosing types of foundation.
- 1.6 Discuss the necessity of bearing capacity and settlement in choosing types of foundation.
- 1.7 Describe the design loads as the factors in choosing types of foundation.

2 Understand the soil stabilization.

- 2.1 State the meaning of soil stabilization.
- 2.2 Mention the various methods of soil stabilization.
- 2.3 Describe the process of addition and removal of soil particles for soil stabilization.
- 2.4 Describe the soil stabilization by drainage.
- 2.5 Describe the process of sand piling.
- 2.6 Describe the process of soil cement stabilization.

3 Understand the bearing capacity of soil.

- 3.1 Define the bearing capacity and ultimate bearing capacity of soil.
- 3.2 Mention the Tarzaghi's bearing capacity factors.
- 3.3 Express the equations for determination of ultimate bearing capacity of soil for square and circular footing.

- 3.4 Calculate the ultimate bearing capacity of sandy soil.
- 3.5 Explain the allowable bearing capacity of clay.
- 3.6 Explain the allowable bearing capacity of sand.
- 3.7 Describe the method of plate bearing test.
- 3.8 Calculate the allowable bearing capacity of soil.
- 3.9 Explain the methods for improving bearing capacity of soil.

4 Understand the pile.

- 4.1 Define and classify pile.
- 4.2 Differentiate precast & cast in situ pile.
- 4.3 Describe methods of cast in situ and precast pile.
- 4.4 Explain the bearing capacity of pile.
- 4.5 Explain End bearing and skin friction pile.
- 4.6 Describe the skin friction and negative skin friction.
- 4.7 State the meaning of end bearing pile.
- 4.8 Solve the problems for Precast and Cast in situ pile.

5 Understand anchors.

- 5.1 Define the ground anchors.
- 5.2 Describe the anchor in sand.
- 5.3 Describe the anchor in stiff clay.
- 5.4 State the advantage of anchoring.

6 Understand the foundation on sand and non-plastic silt.

- 6.1 Mention the characteristics of sand and silt deposits.
- 6.2 Explain footing on sand.
- 6.3 Explain raft on sand.
- 6.4 Describe the process of excavation in sand.
- 6.5 Explain piles in sand.
- 6.6 Explain piers on sand.

7 Understand the foundation on clay and plastic silt.

- 7.1 Mention the characteristics of clay and plastic silt deposits.
- 7.2 Explain footing on clay.
- 7.3 Explain raft on clay.
- 7.4 Describe the process of excavation in clay.
- 7.5 Explain piles in clay.
- 7.6 State piers on clay.
- 7.7 Explain settlement of foundations underlying by clay.

8 Understand the foundation on non-uniform soils.

- 8.1 Define the non-uniform soils.
- 8.2 Describe the characteristics of soft or loose strata overlaying firm deposit.
- 8.3 Explain the dense or stiff layer overlaying soft deposit as foundation material.
- 8.4 Describe the characteristics of alternating soft and stiff layers.
- 8.5 Describe the characteristics of irregular deposit.

- 8.6 Describe the excavation in non-uniform soils.
- 8.7 Describe the stability of slope in non uniform soils.

9 Understand the foundation on rock.

- 9.1 State the basis for design of foundation on rock.
- 9.2 Explain foundation on un-weathered rock.
- 9.3 Explain foundation on weathered rock.
- 9.4 State the treatment of rock defects.
- 9.5 Describe the process of excavation in rock.

10 Understand the excavating and bracing.

- 10.1 State open excavation with unsupported slope.
- 10.2 Mention the necessity of sheeting and bracing.
- 10.3 Describe sheeting and bracing for shallow excavation.
- 10.4 Describe sheeting and bracing for deep excavation.

11 Understand the sheet pile, cofferdam and bulkhead.

- 11.1 State the meaning of sheet pile, coffer dam and bulk head.
- 11.2 Mention the different types of sheet pile and bulkhead with sketches.
- 11.3 State the forces action on a bulkhead.
- 11.4 Determine the embedded length of cantilever sheet pile in cohesive soil.
- 11.5 Determine the embedded length of cantilever sheet pile in non-cohesive soil.
- 11.6 Design an anchored bulkhead using free earth support method for:
 - a. Granular soil.
 - b. Cohesive soil below dredge line.
- 11.7 Solve problems relating cantilever sheet pile and anchored bulkhead.

12 Understand the damages due to construction operations.

- 12.1 State the settlement due to excavation.
- 12.2 State the settlement due to vibration.
- 12.3 Describe the settlement due to lowering the water table.
- 12.4 State the displacement due to pile driving.

Practical:

- 1 Perform the stabilization of soil by cement-sand method.
- 2 Perform the stabilization of soil by sand pile method.
- 3 Determine the bearing capacity of a test pile.
- 4 Prepare a model of pile foundation.
- 5 Prepare a model of raft foundation.
- 6 Prepare a model of pier foundation.
- 7 Perform the Standard Penetration Test (SPT).
- 8. Calculate load bearing capacity of precast pile
- 9. Calculate load bearing capacity of cast in situ pile.
- 10. Perform field test of bearing capacity of soil as per manual.
- 11. Field visit.

REFERENCE BOOKS

- 1 Foundation Engineering
- Peck and Henson
- 2 Soil Mechanics & Foundation
- B.C Punmia
- 2 Foundation Engineering
- Leonard
- 3 Soil Mechanics
- Craig
- 4 Building Construction
- S.C Rangwala
- 5 LGED Manual for soil investigation

AIMS:

To be able to develop knowledge and skills in the field of Civil Engineering Software like STAAD Pro, ETABS, GRASP, SAP, RSEPS with Special emphasis on:

- Structural analysis by using various types of software.
- Draw the SFD & BMD by using the software.
- Perform truss analysis by using the software.

- Different set up of estimation software.
- Different command of Software.
- Modification & editing of Software.
- Develop skills in Estimation Software.
- Run the software.
- Printing the output of software.

Short Description:

Different set-up of software; Software operating commands; Modification & edits of software; Run the software; Printing the output of software.

Practical:**1 Model Generation**

- 1.1 The Start Page
- 1.2 Starting a New Project
- 1.3 Job Setup
- 1.4 Entering Structural Elements
- 1.5 Working with Grids
- 1.6 Entering Structure Geometry
- 1.7 Editing Structure Geometry
- 1.8 Viewing Structure Geometry

2 Property Assignment

- 2.1 Design Model Geometry
- 2.2 Working with Groups
- 2.3 Assigning Member Properties
- 2.4 Assigning Member Specifications
- 2.5 Assigning Supports
- 2.6 Assigning Loads

3 Analyzing the Model

- 3.1 Preparing for the Analysis
- 3.2 Performing the Analysis
- 3.3 Viewing the Output File

4 The Post Processor

- 4.1 Introduction to the Post Processor
- 4.2 Activating the Post Processor and displaying the Displacement Diagram
- 4.3 Displacement and Reactions Tables and Verifying the Results
- 4.4 Viewing Results
- 4.5 Using Structural Tool Tips to View Results
- 4.6 Labeling the Structure Diagram
- 4.7 Plotting Output

8 Estimation for Road works

- 8.1 Box Cutting
- 8.2 Improved sub grade
- 8.3 Sub Base Course
- 8.4 End Edging
- 8.5 Base Course
- 8.6 Surfacing works
- 8.7 Concrete pavement
- 8.8 HBB road
- 8.9 CC block road
- 8.10 Road maintenance & protective works

9 Estimation for Bridge works

- 9.1 temporary bamboo/wooden bridge and diversion road
- 9.2 Bailey bridge, steel bridge.
- 9.3 Excavation, dewatering, artificial island, cofferdam
- 9.4 Sand filling, brick soling, plain cement concrete, brick work, plaster.

10 Estimation for Foundation works

- 10.1 pile work
- 10.2 well foundation
- 10.3 MS fabrication, re-bar coupler
- 10.5 Repair & rehabilitation works

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 ভট্টাচার্য-ব্যবস্থাপনা এর মৌলিক ধারণা, ব্যতিক্রম প্রকাশনী ঢাকা। Matz Usry-Cost Accounting: Planning & Control.