BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

SYLLABUS (PROBIDHAN-2016)

SURVEYING TECHNOLOGY

TECHNOLOGY CODE: **678**

6th SEMESTER

DIPLOMA IN ENGINEERING

PROBIDHAN-2016

SURVEYING TECHNOLOGY (678)

SIXTH SEMESTER

Sl. No	Subject code	Name of the subject	T	P	C	MARKS				
						Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1	67861	Land Management	2	0	2	40	60	-	-	100
2	67862	Advance surveying-II	2	6	4	40	60	50	50	200
3	67863	Digital topographic Surveying	2	3	3	40	60	25	25	150
4	66463	Design of Structure -I	2	3	3	40	60	25	25	150
5	66462	Transportation Engineering -1	2	3	3	40	60	25	25	150
6	66458	Construction Process	2	3	3	40	60	25	25	150
7	65852	Industrial Management	2	0	2	40	60	-	-	100
		Total	**14**	**18**	**20**	**280**	**420**	**150**	**150**	**1000**

67861 Land Management *T P C*
2 0 2

AIMS

- Memories the history of land management in Bangladesh.
- Recognize the system of land management.
- Describe the functions of the ministry of land
- Other organization regarding land management.
- Explain the land management act ordinance and rules.

SHORT DESCRIPTION

History of land management; function of land related organization and land management system, five years settlement of 1793, permanent settlement regulation 1973 Sunset law, land related act, The Bengal allusion and dilluvion regulation 1825, The Bengal survey act 1875, The Bengal tenancy act 1885, The East Bengal state Acquisition & Tenancy Act 1950, The East Bengal Tenancy Rule 1954-55, Government Estate manual (GE) 1958, and land management manual 1990, Survey and settlement manual 1935, Land development ordinance 1976 and its amendment 1982, Land reforms ordinance 1984, Land acquisition ordinance and rules 1982, Land acquisition act 1989 and Land acquisition act 1989 on urgent, Land requisition ordinance 1982, law inheritance (Muslim's law and Hindu's law) amendment of the East Bengal state Acquisition & tenancy Act 1950, The non-agricultural tenancy act 1949, the public demand recovery act 1913, The land registration 1908, vested property act 2001, vested property rules 2012.

DETAIL DESCRIPTION

1. **Understand the land and its history in Bangladesh**
   - 1.1 Define land laws.
   - 1.2 Important of land laws in Bangladesh.
   - 1.3 Difference of land related act, ordinance, rules and orders.
   - 1.4 Define land management system.
   - 1.5 Explain the brief History of land Management in Bangladesh.
   - 1.6 Mention the objectives of land management system.
   - 1.7 State the sunset law.
   - 1.8 State the one year, five years, ten years, the permanent settlement regulation of 1793.
   - 1.9 Difference of many kind of khatian/Porcha.
   - 1.10 Understand the following terms related to the land management:
     Mutation, Different type of registrars and return use in office, Dakhila, DCR, Sayrat Mohall, Hat Bazar, Khas land, Char land, Exchange property, Permanent lease, Temporary lease, Wakf property, Holding, Patta, Kabuliot, Rayat, EstaUes, land reform committee (National, District & Upazila level)

2. **Understand the concept of land related act.**
   - 2.1 Mention the different land related act.
   - 2.2 Explain the rent Act 1938.
   - 2.3 Explain the Floud commission Act-1938
   - 2.4 State survey and settlement manual 1935
   - 2.5 Explain different rules related to survey and settlement manual 1935
   - 2.6 Describe the main section of survey and settlement manual 1935

3. Understand the function of land related organization.

3.1 State the function of National land reform porishad (national level)
3.2 State the function of land Administrative Board under Act-1980
3.3 Describe the function of land Reforms Board under Act-1989
3.4 State the function of land Appeal Board under Act-1989.
3.5 Explain the function of Collector [ADC (Rev)] at District level, Assistant Commissioner (land) at Upazilla level.
3.6 State the function of Tahsilder at union level and other
3.7 State the function of the Director of Land Record.
3.8 State the function of the commissioner at divisional level.
3.9 State the function on of land survey tribunal And Land survey Appellate tribunal Act-2004

4. Understand the concept of (a) the East Bengal State Acquisition & Tenancy act-1950 and its Amendment.

4.1 State the East Bengal State Acquisition and Tenancy Act-1950.
4.2 Describe the main section of the East Bengal State Acquisition and Tenancy Act 1950.
4.3 Simple idea section 1-78 and Brief idea section 79-152.
4.4 State the amendment of The East Bengal state Acquisition & tenancy Act, 1950.
4.5 Describe the East Bengal state Acquisition & tenancy amendment Act, 1994.
4.6 Describe the East Bengal state Acquisition & tenancy amendment Act, 2004.
4.7 Describe the East Bengal state Acquisition & tenancy amendment Act, 2006.

5. Understand the East Bengal Tenancy Rules 1954-55 & GE manual 1958

5.1 State East Bengal Tenancy Rule 1954-55
5.2 Describe the main section of the East Bengal Tenancy Rule 1954-55
5.3 State the GE manual 1958
5.4 Explain the different rules related to GE manual -1958
5.5 Describe main section of GE manual 1958
5.6 State the land management manual 1990
5.7 Explain the different rules related to land management manual 1990

6. Understand the land development tax ordinance 1976, its Amendment 1982 And land development tax rules 1976

6.1 State the land development tax ordinance 1976.
6.2 Explain different rules related to land development tax ordinance 1976.
6.3 Describe the main section of the land development tax ordinance 1976.
6.4 State the land development tax ordinance (Amendment) ordinance 1982
6.5 Describe the main section of the land development tax ordinance (Amendment) 1982
6.6 State the land development tax rules 1976
6.7 Describe the main section of the land development tax rules 1976
6.8 State land Acquisition ordinance 1982.

7. Understand the Acquisition ordinance and Reforms ordinance

7.1 Describe different rules related to land Acquisition ordinance 1982.
7.2 Describe the main section of the land Acquisition ordinance 1982.
7.3 State the land Acquisition of Immovable property Rules 1982.
7.4 Describe the different rules related to land Acquisition rules 1982.
7.5 State land Acquisition Act 1989 on urgent.
7.6 Describe different rules related to Land Acquisition Act-1989.
7.7 Describe different section of Land Acquisition Act-1989.

8. Understand the Following ordinance and law.

8.1 State the enemy property ordinance 1969.
8.2 State the enemy property Act 1974.
8.3 State the vested property Act 1974.
8.4 State the Requisition of Immovable property ordinance 1982.
8.5 Describe the different section of Requisition ordinance 1982
8.6 State the vested property Act 2001.
8.7 State the vested property rules 2012
8.8 State the limitation Act,1908.

9. Understand the Following ordinance and law.

9.1 State the registration act, 1908.
9.2 Describe the main sections of the non-registration tenancy act, 1908.
9.3 State the public's demand recovery act, 1913.
9.4 Describe the main sections of the public's demand recovery act, 1913.
9.5 State the non-agricultural tenancy act, 1949
9.6 Describe the main sections of the non-agricultural tenancy act, 1949

10. Understand the different orders, Rule's, Act's on abandoned property

10.1 State the Bangladesh abandoned property (control, management & disposal) order 1972
10.2 State the Bangladesh abandoned property (taking over possession) Rule's 1972.
10.3 State the Bangladesh abandoned property (Land building and other property) Rule`s 1972.
10.4 State the Bangladesh abandoned property (Building in the urban area)Rule`s1972
10.5 State the Bangladesh abandoned property (Commercial concern) Rule's 1972.
10.6 State the Bangladesh abandoned property (Industrial) Rule's 1972.
10.7 State the transfer of property Act 1982.
10.8 Describe the main section of transfer property Act, 1982.

11. Understand Law of inheritance & permanent settlement regulation.

11.1 State law of inheritance.
11.2 Explain the common principles of Muslin Law of inheritance.
11.3 Explain the common principles of Hindu's Law of inheritance.
11.4 State the permanent settlement regulation 1793.
11.5 Mention the objectives of the permanent settlement regulation 1793.
11.6 Mention the main feature of the permanent settlement regulation 1793.
11.7 Explain the right of tenants on land under the permanent settlement regulation 1793.
11.8 Mention who was the land owners in under the permanent settlement regulation 1793.

12.0 Understand the concept of land related act.

12.1 State The Bengal Allusion and Diluvion regulation, 1825.
12.2 Describe the main sections of The Bengal Allusion and Diluvion regulation,1825.
12.3 State The Bengal survey act 1875.
12.4 Describe the main sections of The Bengal survey act, 1875.
12.5 Understand the land reforms ordinance 1984
12.6 Define land reforms ordinance 1984
12.7 Describe difference rules related to land reforms ordinance 1984
12.8 Describe the main section of the land reforms ordinance 1984
12.9 State The Bengal Tenancy Act 1885.
12.10 Important section of the limitation Act.

Reference books:

১. *ভূমি আইন ও ভূমি জরিপ - মোঃ আবুল কালাম আজাদ ও মোঃ নাসির উদ্দিন*
2. Land Dictionary - Hasan Jahangir Alam
৩. ল্যান্ড ম্যানেজমেন্ট - বিবেকানান্দ সরকার
৪. বাংলাদেশের ভূমি ব্যবস্থাপনা - নারায়ণ চন্দ্র দেবনাথ
৫. জমি ক্রয়-বিক্রয় ও নামজারির নিয়মবলী - জনেন্দ্র নাথ সরকার
৬. ভূমি জরিপ পদ্ধতি ও টেনিক্যাল রুলস- অমৃত বাড়ৈ
৭. ভূমি আইন ও জমিজমা বিষয়ক আইন - মোঃ শওকত আলী
৮. ভূমি আইন - শ্রী দীনেশচন্দ্র দেবনাথ
৯. জমিজমার হিসাব নিকাশ ও সংশ্লিষ্ট আইন- মুহাম্মদ আনোয়ার আলি

67862 Advanced Surveying-II

T	P	C
2	6	4

AIMS

- Enable to demarcate boundary line of the city.
- Use of total station, global position system, EDM and electronic field book.
- Able to acquire knowledge, skill and attitude to conduct traverse survey with total station.
- Acquire knowledge and skill to conduct traversing with GPS.
- Determine distance co-ordinate and angle measurement of inaccessible points.
- Acquire knowledge and skill to angle measurement of inaccessible points.
- Acquire knowledge and attitude in the field of Geography information system (GIS.)

SHORT DESCRIPTION

City survey, Features of instrument used in city survey; City survey map; Total station; Operation & use of total station; Operation panel; Horizontal angle; Distance measurement with total station; Co-ordinates measurement with total station; Temporary adjustment of total station; Principle adjustment of total station; Resection measurement & setting out measurement; Setting outline & point projection; Offset measurement and missing line measurement; Data recording; Data memory mode; Change of settings; Principle of making transverse; GPS; GPS receiver; Electric field book, GIS .

DETAIL DESCRIPTION

Theory:

1 Understand the city survey and features of the instruments

1.1 Define city survey.
1.2 Explain the purpose of city survey.
1.3 List the maps and scales required for city survey.
1.4 Describe the method of establishing horizontal and vertical control.
1.5 List the instruments and accessories used in city survey.
1.6 Mention the uses of chain, ranging rod, offset rod, optical square, tape, arrow and other equipment.

2 Understand the concept of city survey map.

2.1 Mention the classification of city survey map.
2.2 State the meaning of topographic map, wall map, underground and city property map.
2.3 Describe the method of making topographic map.
2.4 Explain the object of property survey of the city.
2.5 Describe the method of mixing property map of the city.
2.6 Explain the method of making wall map of the city.
2.7 Describe the method of drawing underground map of the city.
2.8 Describe the method of locating details on the city map.
2.9 Explain the system of preservation of detail notes of city survey.

3 Understand the fundamentals of total station.

3.1 List the common parts of a total station.
3.2 List the function of different parts of the total station.
3.3 Mention the necessity of check & adjustment of total station.

3.4 Describe the procedural steps of setting total station.
3.5 Describe the basic key and soft key operation.
3.6 Define inputting letters and figures.
3.7 Mention and state the function of allocation key
3.8 Explain configuration mode, measurement mode and memory mode.
3.9 Describe the process of selecting different options.

4. Understand distance measurement with total station & 3D co-ordinates .

4.1 List field work involve in survey with total station.
4.2 Describe the procedure of measuring horizontal distance with total station.
4.3 Describe the procedure of measuring vertical distance with total station.
4.4 Explain 3-D co-ordinates.
4.5 State the procedure of entering instrument station data.
4.6 Mention the procedure of azimuth angle setting.
4.7 Describe the procedure of 3-D co-ordinates measurement.

5. Understand the temporary adjustment of the total station.

5.1 Mention the procedure of centering and leveling.
5.2 Mention the procedure of horizontal and vertical circle indexing.
5.3 Explain the significance of temporary adjustment.
5.4 Describe different steps of temporary adjustment of total station.
5.5 List the principle types of adjustment.
5.6 Describe the fundamental lines of total station.
5.7 Mention the relation among the fundamental lines.
5.8 State the check and adjustment of total station.
5.9 Mention the techniques of checks and adjustment of total station.

6. Understand resection measurement and setting out measurement.

6.1 Explain co-ordinates resection measurement.
6.2 Describe height resection measurement.
6.3 Explain distance setting out measurement.
6.4 Explain co-ordinates setting out measurement.
6.5 Describe REM setting out measurement.
6.6 Explain setting out line point and setting out line.
6.7 Explain point projection.
6.8 Define changing instrument option.
6.9 State difficult restrings setting

7. Understand the missing line measurement.

7.1 State single distance offset measurement and angle offset measurement.
7.2 Explain two distances offset measurement.
7.3 Describe the procedure of changing the starting point.
7.4 Recording distance and co-ordinate data.
7.5 Describe the process of reviewing the job data.
7.6 Explain selecting/ deleting data.
7.7 Explain reviewing known point data.
7.8 Registering/ deleting/ reviewing codes
7.9 Describe outputting job data.

8. Understand the principle of making traverse with total station & EDM.

8.1 List the field work involve in making traverse with total station
8.2 Describe the procedure of measuring interior angle of traverse.
8.3 Describe the procedure of conducting the traverse survey with total station.
8.4 Compute the Gales traverse with the help of total station.
8.5 Plot the map of the traverse survey.
8.6 State the advantages of EDM.
8.7 Describe the operational steps of setting EDM.
8.8 Explain the procedure of measuring horizontal distance and vertical height with EDM.
8.9 Describe the procedure in conducting traverse survey with EDM and plotting map.

9. Understand the principle of operation of using GPS receiver.

9.1 Explain GPS and its working principle.
9.2 State different types of GPS and its function.
9.3 State key pad layout (show operation, function, alpha numeric key).
9.4 Mention the procedure of entering data from the alpha numeric key.
9.5 Mention the operational steps of setting GPS.
9.6 State the method of initialization of the starting position (manually, self initialization).
9.7 Describe the operation process of the instrument related to lips.
9.8 Describe the method of orienting antenna.
9.9 State the set up function and mask angle.
9.10 Use of RTK Base GPS .

10. Understand the operational procedure of GPS receiver.

10.1 Describe the procedure of finding co-ordinates of a station using GPS.
10.2 State the procedure of finding azimuth and co-ordinates of unknown points with GPS.
10.3 State the procedure of obtaining yours position with GPS.
10.4 State the procedure of selecting map datum.
10.5 State satellite status codes.
10.6 Describe the procedure of conducting route and navigation survey with GPS.
10.7 Describe the different types software used in GPS receiver.
10.8 State the application of different software.

11. Understand the operation and uses of electronic field book.

11.1 State the function and purpose of EFD.
11.2 Mention feature of the key board layout.
11.3 Mention the function of operation key & soft key.
11.4 Describe the process of clearing data.
11.5 Describe numeric, alpha numeric and operation field.
11.6 Describe editing notes and codes.
11.7 Describe the process of transmitting EFD files.
11.8 State receiver EFD files from computer.

12.Application of GIS Map.

12.1 Mention different types of GIS software.
12.2 Describe required hardware and software for GIS.
12.3 Install ArcMap software and identify different working tools.
12.4 Prepare a Base Map showing all features in standard GIS format.
12.5 Prepare a Contour map showing all existing /proposed Infrastructure in GIS Environment.
12.6 Prepare a DEM Map showing all existing /proposed Infrastructure in GIS format.

12.7 Prepare a KMZ file of all features should be overlaid on Google image.
12.8 Collect all views of Picture in existing features in different modes.
12.9 Describe the procedure of plotting map in the computer.

Practical

1. List the instruments, lists & accessories used in city survey.
2. Prepare layout of buildings using theodolite/ total station.
3. Prepare wall map and underground map using theodolite/ total station.
4. Perform temporary adjustment of total station.
5. Determine horizontal and vertical distance with total station.
6. Determine height and distance of a tower using total station.
7. Determine the width of the river with total station.
8. Conduct traversing with a total station and plot maps.
9. Determine the co-ordinates of any point from a given station by using GPS.
10. Enter 3-D co-ordinates and output the data of given area.
11. Conduct route and navigation survey with GPS.
12. Measure the latitude and longitude of your position using GPS.
13. Observe your speed, distance and time to reach your destination of the place using GPS.
14. Determine the right direction with the help of GPS.
15. Perform the following with EFB:
    - Create a new job.
    - State on existing job.
    - Change the name of a job.
    - Select required instrument
    - Set the job
    - Set the time and date.
    - Detect the Job
    - Remove a job from the EFB
    - Set up the station.
    - Observe the back sight.
    - Enter known co-ordinates
    - Calculate the area.
16. Perform important of digital data in ArcView GIS analyses
    - Save the digital data
    - Add external data
    - Flaw chart
    - Construction topology
    - Choking and editing error
17. Perform important & represent image with true false color.
18. Classify row image
19. Projection image with real world co-ordinate
20. Explain the analyses image

Reference Book:

1. Advance Surveying (Total Station, GIS and Remote Sensing)
   -by Satheesh Gopi, R.Sathikumar, N.Madhu
2. GPS for land surveyors
   - by Jan Van Sickle
3. Basic GIS Coordinates
   - by Jan Van Sickle

67863 Digital Topographic Surveying T P C
2 3 3

AIMS

- Use Total station, global positioning system (GPS), electronic field book.
- Acquire knowledge, skills and attitude to conduct digital survey
- Understand the digital topographic survey and the modes of conducting digital topographic survey using total station/GPS/RTK Base GPS
- Develop knowledge, skill and attitude of drawing digital topographic map.
- Understand the setting out works and modes of setting outs plans/alignments of buildings, highways, railway, canals, tunnels, etc.

SHORT DESCRIPTION

Digital Topographic survey; Modes of conducting digital topographic surveying; Grade contour; Digital Topographic map; measurement of areas using Total station, planimeter and other methods; Measurement of volume using digital topographic map; Setting out works of plans; Setting out works of tunnels and RTK Base GPS.

Theory:

DIGITAL TOPOGRAPHIC SURVEYING

1. Understand the concept of digital topographic surveying.

1.1 Understand the concept of digital topographic surveying.
1.2 Explain the meaning of topography, relief, digital topographic surveying
1.3 Explain Topographic map/digital topographic map.
1.4 Mention the recommended scales of topographic maps.
1.5 Describe the methods of representing relief.
1.6 Explain the factors on which contour interval and horizontal equivalent depend.
1.7 Explain the characteristic features which are used in plotting or reading a topographic Map/digital topographic map.

2. Understand modes of conducting digital topographic surveying.

2.1 Describe a Total station and its working principle.
2.2 Describe the procedure of digital topographic surveying.
2.3 Explain the methods of locating contours using level/total station/GPS.
2.4 Describe the method of contouring the hilly areas using level/total station/GPS.
2.5 Explain methods of interpolating contours.
2.6 Determine the co-ordinates of points in specific cases in respect of horizontal and vertical control.

3. Understand the grade contour.

3.1 Define grade contour.
3.2 Use of latest Robotic Total Station.
3.3 Explain the mode of providing grade contour using Total station/GPS.
3.4 Explain the mode of providing grade contour using Total station/GPS.
3.5 Explain the tracing of contour gradient and location of routes from topographic map.
3.6 Solve problems

4. Understand the use of topographic map.

4.1 Explain the drawing of cross section from topographic map/digital topographic map.
4.2 Explain determination of indivisibility of two points using topographic map.
4.3 Describe the measurement of drainage areas using topographic map.
4.4 Describe the calculation of reservoir capacity using topographic map.

4.5 Explain the surface intersection from topographic map.
4.6 Explain the measurement of volume from topographic map.
4.7 Solve problems related to area & volume from topographic map.

5. Understand the measurement of areas using planimeter, Total station and other method.

5.1 Describe a planimeter and its use.
5.2 Describe the process of measurement of areas using digital planimeter.
5.3 Explain the zero circle of a planimeter.
5.4 Explain the multiplying constant of planimeter.
5.5 Describe the process of measurement of areas using Total station/GPS.
5.6 Describe following methods of measurement of areas:
a) Computerized methods using digital topographical map.
b) Dividing the areas into some triangles.
c) Areas from offsets to a base line at regular interval.
d) Average ordinate rule.
e) Trapezoidal rule.
f) Simpson's rule.
5.7 Compare between computerized method and manual method of measurement of areas.

6. Understand the measurement of volumes using topographic map/digital topographic map.

6.1 Explain the measurement of volumes by the following methods:
a) Cross-section method.
b) Spot leveling method.
c) Contour method.
d) Computerized methods with the help of Total station/GPS.
6.2 Describe the process of the measurement of volume using Total station/GPS.
6.3 Introduction to TLS for topo-Survey.
6.4 Explain Prismoidal correction in determining volumes.
6.5 Explain the correction of curvature.

7. Understand the concept of setting out works of plans/alignments.

7.1 Explain setting out works of a plan or an alignment.
7.2 List instruments and accessories required for setting out works.
7.3 Describe the procedure of fixing the center line of a building or a road using Total station/GPS.
7.4 Describe the procedure of giving RL on different parts of the building or road using Total station/GPS.
7.5 Explain setting out works of a building using Total station/ RTK Base GPS .
7.6 Explain setting out works of a culvert Total station/ RTK Base GPS .
7.7 Explain setting out works of a bridge Total station/ RTK Base GPS .

8. Understand the setting out works of tunnels.

8.1 Explain the importance of tunnel construction.
8.2 Mention different operations of setting out works of tunnel.
8.3 List the instruments used in tunnel setting out works (including digital survey instruments)
8.4 Describe setting out works surface alignment using Total station/ RTK Base GPS Describe setting out works from the ends.

8.5 Explain transferring alignment underground using Total station/ RTK Base GPS.
8.6 Explain transferring levels underground using Total station/ RTK Base GPS.
8.7 Explain setting out underground bench marks using Total station/ RTK Base GPS.
8.8 Explain importance of accuracy in tunnel surveying.

9. **Understand the concept of geodetic surveying.**
9.1 Explain the purpose of geodetic surveying.
9.2 Define geodetic control point?
9.3 Explain horizontal and vertical control points.
9.4 Identify the Standard Geodetic datum in the World.
9.5 State GCS (Geographic Coordinate System) .
9.6 Define UTM (Universal Transverse Mercator) System.
9.7 Using Geographic Tools (Coordinate Conversion / Datum Transformation)
9.8 Convert GCS to UTM and vise-versa.
9.9 Define BUTM (Bangladesh Universal Transverse Mercator) System.

10. GPS Real Time Kinematic Topographic Survey procedure
10.1 Purpose and Scope of RTK Topographic Survey.
10.2 RTK Field Technique and procedure
10.3 Standard RTK observing procedure
10.4 RTK Survey field data collection procedure and Checks
10.5 Guidance for setting construction control points using RTK technique.
10.6 Detailed use of RTK Base GPS.
10.7 Use of GNSS RTK for Topographical Survey.

Practical:

1. Conduct a Digital Topographic Survey with total station in your own Institution and plot maps including computation of areas.
2. Perform layout plan of a high-rise Building including pile, pile cap, grid line, column etc.
3. Layout the alignment of the following (using Total station/ RTK Base GPS):
   a) Irrigation canal.
   b) Highway/road.
   c) Sewer pipe line.
   d) Underground tunnel.
   e) Vertical alignment of building/tower.
4. Collection GNSS/RTK Base GPS Survey field data procedure and Checks.
5. Plot a Topographical survey map with the help of plotter/printer using different scale.
6. Measure the latitude and longitude of a place in your Institution using GPS receiver.
7. Observe your speed, distance and time to reach your destination and find the Latitude and longitude of the place.
8. Conduct a geodetic survey using GPS receiver and plot maps including computation of areas.
9. To locate a geodetic position in Google Maps and add label of the target places.
10. Transfer a SOB BM using leveling operation in a project area and mark position of TBM on a pillar.

11. **REFERENCE BOOKS**

1 Advance Surveying - Natarajan

2 Surveying (Volume-2) - Dr. B.C. Punmia

3 A Text Book of surveying (Volume-II) - P.B. Shahani

4 Manual SOKIA total station

5 Advance Surveying -by Satheesh Gopi, R.Sathikumar, N.Madhu

6 GPS for land surveyors - by Jan Van Sickle

7 Super Topographical maps - by Askwadeep saha

66463	*Design Of Structure - I*	*T*	*P*	*C*
		2	**3**	**3**

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

66462 Transportation Engineering- I T P C
2 3 3

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 turfing 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.
9.6Classify 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

66458 Construction Process T P C
2 3 3

AIMS

- Illustrate concrete construction and its quality control methods.
- Explain construction and supervision of all type of foundations.
- Discuss the process, techniques and materials used in different types of masonry.
- Analyze the construction process of arch and lintel.
- Describe the construction process of different types of floor.
- Explain the construction process of stairs.
- Describe the construction process of different types of roof.
- Explain the different finishing works in building.
- Illustrate the construction process of doors and windows.

Short Description

Concrete, Foundation, Shallow foundation, Deep foundation, Brick masonry, Composite masonry, Partition wall, Cavity wall. Arches; Lintels; floors; Damp proofing; Stairs; Roof; Pitched roof; Plastering and pointing; Doors; Windows; Form works, Painting & Varnishing,

Detail Description

Theory:

1 The features and properties of concrete.

1.1 Mention the different kinds of concrete.
1.2 Mention the functions of ingredients of concrete.
1.3 Define the terms: strength, durability, workability, laitance and segregation.
1.4 List the factors affecting the workability of concrete.
1.5 State the necessity of the following tests on concrete:
   a. Slump test.
   b. Compressive test an hardened cube and cylinder.
1.6 Describe how batching of concrete mix is achieved by volume and weight.
1.7 Mention the sequence of placing concrete in different situations.
1.8 State how the curing process affects the strength of hardened concrete.

2 The aspects of foundation.

2.1 State the functions of foundation.
2.2 List the essential requirements of a good foundation.
2.3 List the common causes of failure of foundations.
2.4 Mention the precautions necessary to prevent uneven settlement of foundations.
2.5 Define the term ‘deep foundation.
2.6 Mention the classification of pile foundations according to function or use, materials and composition, method of construction.
2.7 Describe the methods for driving concrete pile,
2.8 Explain grouping of pile cap.

3 The features of brick, stone & composite masonry.

3.1 State the meaning of brick masonry.
3.2 List the tools required for brick masonry.
3.3 Define the following terms: header, stretcher, lap, course, bed, joint, closers.

3.4 Identify the defects in brick masonry.
3.5 List the factors to be considered while supervising brick masonry works.
3.6 Mention the functions of good brick bonding.
3.7 Describe the bonding arrangements around openings and corners.
3.8 State the meaning of composite masonry.

4 The features of partition and cavity wall.

4.1 State the meaning of partition wall.
4.2 Describe the procedure of construction of the following types of partition walls:
   a. Brick partition wall
   b. Concrete partition wall
   c. Glass partition wall
   d. Aluminum partition wall
   e. Light weight partition wall(timber stud work, Particle boards, hollow blocks)
4.3 State the meaning of cavity wall.
4.4 State the construction of cavity wall.
4.5 Explain the necessity of cavity wall construction.

5. Different type of arches and lintels.

5.1 State the meaning of arch and lintel.
5.2 List the common terms used in arches.
5.3 List the common terms used in lintels.
5.4 Mention the different type of arches according to their shape, center and material.
5.5 Describe the correct procedures of construction of arches and lintels.

6. Concept of the floor & roofs.

6.1 State the meaning of floor.
6.2 Mention the components of a floor.
6.3 Mention the essential requirements of a floor.
6.4 Name the suitable materials used for the construction of floor.
6.5 List the different kind of roofs.
6.6 Mention the essential requirements of a good roof.
6.7 Define the technical terms used in roofs.
6.8 Compare the advantages and limitations of flat roof over pitched roof.

7. The dampness of building.

7.1 Mention the causes of dampness in building.
7.2 Mention the ill effects of dampness in building.
7.3 Describe remedial measures against efflorescence.
7.4 Identify different type of termites.
7.5 Name the chemicals used for anti-termite treatment.
7.6 Explain the damages due to termite in building on economic point of view.

8. Define the stairs.

8.1 Mention the functions and location of stairs.
8.2 Define the technical terms used in stairs.
8.3 Mention the requirements of a good stair.
8.4 Express the relationship between tread and riser.
8.5 Mention the classification of stairs.

9. State the plastering and pointing.

9.1 Define plastering and pointing.
9.2 Describe the various types of plastering and pointing on the basis of their suitability and uses.

9.3 Mention the common tools used for plastering and pointing works with their functions.

9.4 Describe the process of applying plaster on a new and old surface.

9.5 Mention the common defects in plastering and pointing.

10. The concept of doors and windows.

10.1 List different type of doors.

10.2 Identify the technical terms used in doors.

10.3 List different type of windows.

10.4 Describe the various type of windows on the basis of their suitability and uses.

11. The significance of form works.

11.1 State the meaning of form works.

11.2 Define centering and shuttering.

11.3 Explain the necessity and uses of form works.

11.4 Mention the essential requirements of a good form work.

11.5 Analysis the behavior and results of various loads on form works.

12. The process of painting & Varnishing.

12.1 State the purpose of painting & varnishing.

12.2 Describe the characteristics of good paints & varnishes.

12.3 State the various defects in painting & varnishing.

12.4 Describe the procedure of application of the following on new and old specific surfaces:

a. white wash
b. color wash
c. distemper
d. weather coat
e. snowcem (cement based paint)
f. plastic emulsion paint
g. Synthetic enamel paint.

Practical:

1. Determine the slump for different concrete works.
2. Conduct cube test for concrete and interpret the results.
3. Conduct cylinder test for concrete and interpret the results.
4. Construct brick pillars of sizes 25cm x 25cm to 75cm x 75cm with English/Flemish bond.
5. Construct corner/tee/cross joints of 25cm to 75cm width English bond brick wall.
6. Perform cement plastering to a new brick walls.
7. Perform cement plastering on a old brick walls.
8. Perform pointing works to a boundary wall.
9. Perform white washing on new and old surface.
10. Perform color washing on new and old surface.

REFERENCE BOOKS

1	Building construction	Dr. B C Punmia
2	Building construction	G J Kulkarni
3	Building construction	S P Aurora and S P Brindra

65852 INDUSTRIAL MANAGEMENT T P C
2 0 2

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 Harzberg.
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.
10.4Discuss the effects of over supply and under supply.
10.5 Explain the following terms :

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

11. Concept of Break Even Point(BEP)

11.1 Define Break Even Point and Break Even Chart.
11.2 Describe the method of determination of BEP
11.3 Explain the terms :

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

12 . Concept of Marketing

12.1 Define marketing.
12.2 Discuss the function of marketing.
12.3 State the objectives of marketing.
12.4 Explain the terms :

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

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

13. Concept of trade union and industrial dispute

13.1 Define trade union.

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

REFERENCE BOOKS

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