BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207

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

CIVIL TECHNOLOGY

TECHNOLOGY CODE: **664**

7th SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CIVIL TECHNOLOGY (664)

7th 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	66471	Civil Engineering Project	0	6	2	0	0	50	50	100
2	66472	Sanitary Engineering	2	3	3	40	60	25	25	150
3	66473	Transportation Engineering -2	2	3	3	40	60	25	25	150
4	66474	Design Of Structure -2	2	3	3	40	60	25	25	150
5	66475	Water Resources Engineering	2	3	3	40	60	25	25	150
6	68873	Construction Management & Documentation	2	3	3	40	60	25	25	150
7	65853	Innovation & Entrepreneurship	2	0	2	40	60	0	0	100
Total			**12**	**21**	**19**	**240**	**360**	**175**	**175**	**950**

66471 Civil Engineering Project

T	P	C
0	6	2

AIMS

- To be able to understand the civil engineering project.
- To be able to develop skill for preparation of different features of civil engineering project.
- To be able to gather experience of preparation of project report on building, foundation and sub-soil investigation.
- To be able to develop skill for interpretation of test result, Steel truss, highway/railway /Flyover/Overpass/underpass/Interchange/Intersection/irrigation and environmental impact analysis.

SHORT DESCRIPTION

Study and report on in respect of multi-storied building; Foundation design; Steel Truss; Highway project; Railway project; Flyover; Overpass; Underpass; Interchange; Intersection; Irrigation canal; Drainage canal; Water supply and sanitation project; Initial Environmental examination (IEE) of a project or any other similar project work as decided by the Head of the Department (HOD) and concern guide teachers.

DETAIL DESCRIPTION

Practical

1. Project on a multi-storied building.

1.1 Select a line plan of a multi-storied (residential or commercial) building.
1.2 Draw the site plan and layout plan of the building.
1.3 Draw the plan, elevation and sections of the building.
1.4 Design different parts and members of the building.
1.5 Prepare the detailed structural drawing of the building.
1.6 Estimate the quantities of different items of civil work of a building including water supply & sanitary works and internal electrification works.
1.7 Prepare a schedule of quantities with specifications and the estimate of building.
1.8 Prepare an abstract of cost from the estimate.
1.9 Prepare and submit a final report for the project.

2. Project on design of foundation of a building.

Select a 6-storied residential building the foundation of which is to be designed. Perform a reconnaissance survey at the proposed building site.

2.1 Collect soil samples from the building site.
2.2 Perform different tests for the soil samples.
2.3 Summarize the test results.
2.4 Interpret the test results.
2.5 Select two alternatives of foundation for the building.
2.6 Design the alternative foundations for the building.
2.7 Estimate the foundation cost for two alternatives.
2.8 Compare and decide which foundation is better for the building.
2.9 Prepare and submit a final report for the project.

3. Project on Steel Truss.

3.1 Select and draw a workshop/warehouse showing the position of trusses.

3.2 List and sketch different types of steel truss suitable for the said workshop/ warehouse.
3.3 Calculate the load to be carried by the trusses.
3.4 Determine the stress of different members of the trusses.
3.5 Design different members of the trusses.
3.6 Design gusset plates and rivet of the trusses.
4.7 Estimate the quantity of materials required for the trusses and 2 coats of painting over a coat of priming.
4.8 Prepare a schedule of quantities with specifications of the items of works.
4.9 Prepare an abstract of cost from the estimate of the trusses.
4.10 Prepare and submit a final report for the project.

4. Project on water supply and sanitary works.

4.1 Select a suitable site for the project (may be institute campus).
4.2 Draw the site plan of the project area showing different buildings.
4.3 Calculate the water demand and quantity of sanitary disposal from the site.
4.4 Calculate the capacity of underground / overhead reservoir and septic tank required.
4.5 Sketch the water supply and sanitary network for the project.
4.6 Estimate the quantities of different items of works for water supply and sanitary works.
4.7 Prepare a schedule of quantities with specifications of the items of water supply and sanitary work.
4.8 Prepare an abstract of cost from the estimate of the project.
4.9 Prepare and submit a final report for the project.

5. Project on Highway/Railway/Flyover/Elevated Express Way/Metro Rail/Underpass/ Overpass/ Interchange/Intersection/Irrigation canal/Drainage canal.

5.1 Select the type and location of the project.
5.2 Make reconnaissance survey and preliminary survey of the project.
5.3 Plot the area of the project.
5.4 Draw the detailed drawing of the project.
5.5 Estimate the different items of works.
5.6 Prepare and submit a final report for the project

6. Project on digital survey by using total station for specific area.

6.1 Leveling the Total Station
6.2 Tripod Setup and Mount Instrument on Tripod
6.3 Focus on Survey Point
6.4 Leveling the Instrument
6.5 Electronically Verify Leveling
6.6 Adjust Image & Reticle Focus
6.7 Measuring the Height of an Object and Target Height
6.8 REM Screen Results and Trouble-Shooting the REM Measurement
6.9 Calibrating the Instrument, 3D Coordinates and Calibrate by back sight by Angle, back sight by Coordinate, Resection, Resection Notes and Coordinate Measurement
6.10 Prepare and submit a final report for the project.

7. Project on Bio-gas.

7.1 Select a suitable site for the project (May be a community or Institute campus).
7.2 Make a reconnaissance and preliminary survey for the project.
7.3 Draw the site plan of the project area showing different building.

7.4 Design a bio-gas plant for different capacity.
7.5 Draw the detailed drawing for the project work.
7.6 Estimate the different items of work.
7.7 Prepare a schedule of quantity with specification of the items of work of the project.
7.8 Prepare and submit a final report for the project.

8. Project on Steel Structure.

8.1 Select a line plan of a multi-storied (residential or commercial) building.
8.2 Draw the site plan and layout plan of the building.
8.3 Draw the plan, elevation and sections of the building.
8.4 Draw the detailed structural drawing of the building from given data.
8.5 Estimate the quantities of different items of civil work of a building including water supply & sanitary works and internal electrification works.
8.6 Prepare a schedule of quantities with specifications and the estimate building.
8.7 Prepare an abstract of cost from the estimate.
8.8 Prepare and submit a final report for the project

9. Project on Initial environmental examination (IEE) of a hydro-electric; bridge; dam; irrigation; construction; water treatment plant; sewage treatment plant; chemical/fertilizer plant; shrimp; leather project etc.

9.1 Select the type and location of a particular project.
9.2 Prepare a checklist with significant environment parameters.
9.3 Develop questionnaires to collect field data.
9.4 Complete initial environment examination (IEE) through checklist.
9.5 Prepare and submit a final report for the project

Note: 1 Report on any one of the project is to be submitted by a group of students consisting of not more than 6. The Head of the Department or the concerned guide teacher(s) may decide for similar project other than those as stated above.

Note: 2 The project is to be prepared covering the following components:

2.1 Project Title
2.2 Executing Agency
2.3 Objectives of the Project
2.4 Location of the Project
2.5 Project Implementation Period
2.6 Log frame
2.7 Procurement Plan
2.8 Year wise Financial and Physical Target Plan
2.9 Project management set-up
2.10 Cost Estimation of project

66472 Sanitary Engineering

T	*P*	*C*
2	**3**	**3**

AIMS

- To be able to compare various methods and techniques used to treat and dispose of sewage and control of water pollution and select appropriate methods for given situations.
- To be able to identify various sewer pipes, fittings, procedures of construction, repair, replacement and maintenance of sewage disposal system.
- To be able to determine the size of circular sewer pipes, septic tanks and soak pit of sewage disposal system.
- To be able to compare various types of pit latrine and biogas generating plants.
- To be able to understand the basic concept of solid waste and management.
- To be able to understand the basic concept of ETP

SHORT DESCRIPTION

Sewage; Sewer pipe; Sewer appurtenance; Flow in sewer; Construction of sewer; Maintenance of sewer; Characteristics of sewage; Sewage disposal; Preliminary Sewage treatment system; Secondary treatment system; Sludge treatment and disposal; Effluent Treatment Plant; Water pollution and its effects on the environment; Rural sanitation; Health and hygiene; Generation of biogas; Sources and classification of solid waste; Municipal and industrial solid waste; different steps of solid management.

DETAIL DESCRIPTION

Theory:

1. Understand sewage, sewer and sewerage system.

1.1 Define sewage, sewer and sewerage.
1.2 Compare various types of sewerage system.
1.3 Outline the advantages and limitations of sewerage system and septic tank.
1.4 Identify various types of sewers of a complete sewerage system.
1.5 Compare the advantages and limitations of uses of different kinds of sewer pipes according to materials of construction.
1.6 Draw the cross-section of different types of sewers, with different types of bedding.
1.7 Describe various kinds of joint in connecting the pipes with the help of sketches.
1.8 List the requirements of a good sewer joint.

2. Understand sewer appurtenances and their purposes.

2.1 Identify various sewer appurtenances.
2.2 Describe various sewer appurtenances with the help of sketches.
2.3 Discuss the factors to be considered for locating the sewer appurtenances.
2.4 Describe with neat sketch of siphon & inverted siphon.
2.5 Discuss the requirements of sewage pumps.
2.6 List various types of sewage pumps.
2.7 Describe the factors to be considered for locating the site of pumping station and state the capacity of pump and pumping stations.

3. Understand the process of designing sewers.

3.1 State different conditions of flow through a sewer.
3.2 Identify self cleansing velocity and grades of sewer.
3.3 Describe the formulas with notations for various kinds of flow of sewage.

3.4 Explain dry weather flow and storm weather flow.
3.5 Calculate the quantity of storm rain by: Rational method & Empirical method
3.6 Identify different hydraulic elements that govern the flow or discharge of sewage through a sewer.
3.7 Solve problems of discharge rates for circular sewers using cheese's formula.

4. Understand the principle of construction of sewers.

4.1 Explain general aspects for preparation of sewerage scheme.
4.2 Describe procedures followed in the construction of sewers.
4.3 Explain the procedure of laying a sewer in a trench.
4.4 Specify with sketch, the setting- out of the fall of sewer for the continuous gravitational flow of sewage.
4.5 Describe the techniques of testing sewer lines and the precautions should be taken during back filling of trenches.
4.6 State different ways of protection for sewer.
4.7 Describe the methods adopted for ventilating sewers.

5. Understand the process of maintenance of sewer.

5.1 Identify the need for maintenance of sewer.
5.2 Identify the precautions to be taken before entering in sewers.
5.3 Identify the factors to be considered for frequent inspection and supervision of sewer so that proper flow is maintained.
5.4 Describe the procedures used to clean and unlock sewer.

6. Understand the methods used for sewage disposal.

6.1 List various methods of sewage disposal.
6.2 State the characteristics of soil which influence waste water disposal.
6.3 Explain the term dilution and its suitability.
6.4 Describe septic tank.
6.5 Compare the design of septic tanks with a soak pit for 20, 50 and 100 users respectively.
6.6 Explain with sketches the construction and operation of a septic tank.

7. Understand the method of sewage treatment.

7.1 Identity the various conditions which directly affect the self purification of sewage in streams.
7.2 Outline the stages of sewage treatment.
7.3 Explain the purpose of preliminary sewage treatment.
7.4 Explain with the help of sketches: Detritus tanks (grit chambers) & Skimming tanks.
7.5 Describe the function of communicators.
7.6 Name different kinds of treatment process for removing impurities of each stage of the treatment process.
7.7 Describe the schematic layout of a typical sewage treatment plant.
7.8 Describe the vacuum flotation method for removing greases and oils.
7.9 Describe with the help of neat sketch of a sedimentation tank giving the factors, which reduce the efficiency of sedimentation tanks.
7.10 Explain the system of Effluent Treatment Plant.

8. Understand the process of sludge treatment and the method of disposal.

8.1 List the various sources of sludge.
8.2 Explain different purposes served by the sludge digestion.
8.3 Distinguish between anaerobic digestion and aerobic digestion.

8.4 Describe the working principles of a vacuum filters and drying beds.
8.5 Identify the methods of ultimate disposal of sludge.
8.6 Explain advantages and disadvantages of incinerating sludge.

9. Understand the water pollution and its effects on the environment.

9.1 Identify the undesirable changes and its effects of pollution on-
   a) Human life
   b) Animal life
   c) Aquatic life
9.2 Describe various sources of water pollution.
9.3 Classify different types of pollution and explain clearly each type of pollution.
9.4 Describe the precautions that should be taken to prevent pollution of water sources from domestic and industrial effluent disposal systems.

10. Understand the rural sanitation practices in Bangladesh.

10.1 Describe the ventilated improved pit (VIP) latrine and simple pit latrine.
10.2 Draw a neat sketch of VIP latrine and describe the special features of VIP latrine.
10.3 Mention the advantages & disadvantages of VIP and simple pit latrine.
10.4 Mention the advantages & disadvantages of single/twin pit pour flush latrine.
10.5 Describe the construction procedures of VIP, single and twin pit pour flush latrine.

11. Understand health and hygiene.

11.1 Describe the common diseases.
11.2 Explain the importance of hygiene education.
11.3 Describe the scope and methodology for hygiene education.
11.4 Explain the advantages of social mobilization for hygiene practice.
11.5 Explain integrated approach for water, sanitation and health education.

12. Understand the concept of biogas.

12.1 Explain the process of generating fuel gas with cow dung /human waste / other organic wastes.
12.2 Explain the term biogas.
12.3 Explain the working principle of a biogas plant with the help of neat sketch.
12.4 Describe the construction procedure of a biogas plant.
12.5 Compare the advantages and disadvantages of using small scale biogas plant in Bangladesh.

13. Understand the municipal and industrial solid waste and its management.

13.1 Describe the classification of municipal solid waste materials.
13.2 Describe the general sources of municipal solid waste.
13.3 Describe the garbage, rubbish and trash.
13.4 Mention the classification of different types of industrial solid waste.
13.5 Describe the hazardous industrial solid waste.
13.6 Describe the medical waste and its disposal.
13.7 List different steps for collecting solid waste according to category.
13.8 Mention different steps for disposal solid waste.
13.9 Show with neat sketches the flow diagram of different steps of solid waste management from generation to disposal.

PRACTICAL:

1. **Sketch different types of plumbing fixtures.**
   - 1.1 Draw sketches of water closet suite which includes a commode, flushing cistern and connecting pipe etc. showing necessary dimensions.
   - 1.2 Draw the sketches of bath tub, shower bath, urinals, lavatory or wash basin, sink, laundry tray, drinking fountain etc. showing dimensions including their levels.
   - 1.3 Draw the sectional view of an automatic flushing tank with a flush valve and indicate individual name of each part.
2. **Sketch manhole, septic tank and soak pit.**
   - 2.1 Draw the plan views and detail sectional views of manhole, septic tank and soak pit
   - 2.2 Indicate the individual parts.
   - 2.3 Show the dimensions of manhole, septic tank and soak pit.
3. **Make connection of different sanitary fixtures.**
   - 3.1 Select tools and equipment and necessary materials required to connect sanitary fixtures.
   - 3.2 Arrange support for fixtures, make proper level and install the fixtures giving required connections for use.
4. **Replace unserviceable sanitary fixtures.**
   - 4.1 Apply correct methods for repairing and replacing unserviceable sanitary fixtures.
   - 4.2 Select proper tools and equipment and materials needed for repairing unserviceable fixtures.
   - 4.3 Detect the defect of fixtures and get the work done.
5. **Prepare a model of manhole, septic tank and soak pit.**
6. **Sketch Pit latrine, Twin pit latrine, VIP latrine and sketching, layout plan of pipe line.**
   - 6.1 Draw plan, section and sectional elevation of pit latrine, twin pit latrine, VIP latrine.
   - 6.2 Draw neat sketch of layout plan of pipe line.
7. **Sketch the Effluent Treatment Plant and show the different components in the figure.**
   - 7.1 Draw plan, section and sectional elevation of Effluent Treatment Plant.
   - 7.2 Draw neat sketch of layout plan of pipe line.
8. **Prepare a model of slab with water seal pan with ring.**
9. **Perform a case study in solid waste management (generation to disposal) of your campus.**

REFERENCE:

1. Waste water Engineering - Metcalf & Eddy Inc
2. Internet

66473 Transportation Engineering – 2

T	P	C
2	3	3

AIMS

- To be able to understand the components of railway track, bridge & culvert, stations & yards and assess important requirements and functions of each.
- To be able to understand the curves used in railway track and assess the limiting radii.
- To be able to understand the control system of railway track and assess their importance.
- To be able to understand the maintenance, service and repair procedures, methods and technique used to keep the railway operational.

SHORT DESCRIPTION

History of railway; Railway surveys; Permanent way; Rail fastening; Sleeper; Ballast; Creep; Station and yard; Points and crossings; Signaling; Railway bridges, culverts and Tunneling; Maintenance of railway; Harbor and Port.

DETAIL DESCRIPTION

Theory:

1. Understand the history of railway and railway surveys.

1.1 Describe a brief history of railways.
1.2 Mention the characteristics of railways.
1.3 Mention the Advantages of Railway over highways.
1.5 Mention the objectives of railway surveys.
1.6 Describe the importance of reconnaissance survey for railways.
1.7 Describe the process of preliminary survey for railways.
1.8 Describe in details the final location survey for railways.
1.9 Describe the future of railways in Bangladesh.

2. Understand the permanent way.

2.1 State the requirements of permanent way.
2.2 Describe rail, rail gauge, and dual gauge.
2.3 Mention the requirements of an ideal rail.
2.4 Mention the advantages different types of rail gauge used in Bangladesh.
2.5 Illustrate weight and section of rail.
2.6 Explain the methods of rectifying damaged rail.
2.7 Mention the points that govern the length of rail.
2.8 State the methods to be adopted to reduce wear of rail.
2.9 Mention the precautions to be taken to prevent buckling of rail.
2.10 Illustrate the advantages and disadvantages of coning of wheel.

3. Understand the concept of rail fastening.

3.1 State the meaning of rail fastening.
3.2 Mention the requirements of an ideal rail fastening.
3.3 Mention different types of rail joint.
3.4 Mention the characteristics of an ideal rail joint.
3.5 State the bearing plate, fish plate, spikes, hook bolt, fang bolt, Chair and keys.
3.6 Mention the advantages and disadvantages of welding rail.

4. Understand the concept of using sleeper in permanent way.

4.1 Describe and functions of railway sleeper.
4.2 Mention the requirements of an ideal sleeper.
4.3 Mention the different types of sleeper.
4.4 Mention the advantages and limitations of timber sleeper.
4.5 Mention the advantages and limitations of steel sleeper.
4.6 Mention the advantages and limitations of concrete sleeper.
4.7 Explain the density of sleepers.

5. Understand the concept of using ballast in permanent way.

5.1 Describe and functions of ballast.
5.2 Mention the characteristics of good ballast.
5.4 Describe the materials used as ballast with their advantages and disadvantages.
5.5 State the meaning of depth of ballast.
5.6 Specify the size of good quality ballast.
5.7 State the necessity of screening of ballast.
5.8 Describe the process of screening of ballast.
5.9 Describe the quantity of ballast needed for construction of permanent way.

6. Understand the concept of creep, super elevation on curves in railway.

6.1 State the meaning of creep in rail.
6.2 Mention the causes of creep in permanent way
6.3 Describe the factors which affect the super elevation in a railway track.
6.4 Calculate the quantity of super elevation in a railway track.
6.5 Define cant deficiency, equilibrium cant, negative cant and cant gradient.
6.6 Explain the speed of train on curve.
6.7 List the procedure for finding respective speeds on main line and branch line.
6.8 Describe the procedure of measuring the amount and correcting of creep.

7. Understand the concept of station and yard.

7.1 Define railway station, wayside station and railway yard.
7.2 Mention the purposes of a railway station.
7.3 Mention different types of railway station.
7.4 Describe the features of a railway station.
7.5 Describe the points to be considered for selecting the site of a railway station.
7.6 Describe different types of railway yard.
7.7 Describe different types of platform used in railway.
7.9 Differentiate between junction and terminal.

8. Understand the concept of points and crossings.

8.1 Define points and crossings.
8.2 Mention the purposes of points and crossings.
8.3 Define the terms: switch, tongue rail, check or guard rail, stock rail, stretcher bar, throw of switch, fouling mark, right hand switch and left hand switch.
8.4 Describe the method of laying sleepers for points and crossings.
8.5 Describe the meaning of clearance and switch angle.
8.6 Describe types of crossing.
8.7 Define the terms: crossing clearance, crossing number and crossing angle.
8.8 Mention the advantages and disadvantages of level crossing.

9. Understand the aspects of signaling in railways.

9.1 Explain the importance of signaling in railways.
9.2 Describe different types and typical layout of signal.
9.3 Discuss the control of movement of trains.
9.4 Describe the pilot guard system and centralize traffic control system.
9.5 Describe automatic signaling.
9.6 State the meaning of interlocking.
9.7 Mention the essential principles of interlocking.

10. Understand the features of Railway Bridge, Culvert and Tunneling in railways.

10.1 Describe the major components of a railway bridge, culvert and tunnel.
10.2 Define the terms: span, flood discharge, waterway, and scour depth, depth of foundation, afflux, clearance and free board.
10.3 Mention different types of Railway Bridge, culvert and tunnels.
10.4 Mention the points to be considered in locating the site for a railway bridge and culvert.
10.5 Mention the purpose and development of railway tunnels.
10.6 Describe the favorable condition, advantages and limitation of tunnels.
10.7 Mention the advantages of underground railways and overhead railway.
10.8 Define metro rail and purpose of metro rail in Bangladesh.
10.9 Describe the advantage and limitation of metro rail.

11. Understand the concept of maintenance work in railway.

11.1 Explain the necessity for maintenance work in railway.
11.2 Mention the advantages of good track maintenance.
11.3 Describe the duties of gang mate, key man and permanent way inspector (PWI) in the maintenance work.
11.4 Describe the process of maintenance work of rolling stock and boxing of ballast.
11.5 Mention the causes of accident in a railway track.
11.6 Describe the process of signaling during maintenance work.
11.7 List the name of tools required for maintenance work.
11.8 Describe the process of packing of ballast in a railway track.
11.9 Explain the importance of inspection of rails and the process of inspection of track.

12. Understand the basic concept of harbor and port.

12.1 State the meaning of harbor and port.
12.2 Mention the purposes and utility of harbor and port.
12.3 Mention different types of harbor and port.
12.4 Mention the suitable location for harbor and port.
12.5 Describe the following terms: natural harbor, semi-natural harbor, artificial harbor, military harbor, commercial harbor, port of entry, ocean port, inland waterway port, free port, and anchorage area, marine terminal and turning basin.
12.6 Mention the points to be considered in selecting the site for a port.

PRACTICAL:

1. Draw the section of a permanent way showing the components.
2. Draw the sketches of double headed rail, bull headed rail and flat footed rail with measurements.
3. Draw the sketches of narrow gauge, meter gauge, broad gauge and dual gauge used in Bangladesh showing the measurements.
4. Draw the sketches of fish plate, bearing plate, dog spike, screw spike, round spike and elastic spike with measurements.
5. Draw the sketches of different types of sleepers used in Bangladesh.
6. Draw the sketches of wayside station, yard, junction and terminals showing platform and other components.
7. Draw the sketches of main track and side track of a double line railway station.
8. Draw the sketches of a level crossing, points and crossing showing all components.
9. Draw the sketches of acute crossing, double crossing, square crossing and diamond crossing.
10. Visit to a nearby station to see the different components of a railway station, harbor and port and submit a report.

REFERENCE BOOKS

1. Railway Engineering - S C Rangwala
2. Railway Engineering – B L Gupta and Amit Gupta
3. Marine Structure and Port Facilities – Quinn
4. Internet

66474 Design of Structure – 2

T	P	C
2	3	3

AIMS

- To be able to select suitable reinforcement and section required for reinforced cement concrete solid floor / roof slab.
- To be able to select suitable reinforcement and section required for reinforced cement concrete column.
- To be able to select suitable reinforcement and section required for reinforced cement concrete stair slab.
- To be able to select suitable reinforcement and section required for reinforced cement concrete footing for brick wall and reinforced cement concrete wall.
- To be able to select suitable reinforcement and section required for reinforced cement concrete column footing.
- To be able to select suitable reinforcement and section required for reinforced cement concrete cantilever retaining wall.
- To be able to supervise the placement of reinforcement for all types of reinforced cement concrete works.
- To be able to acquire preliminary knowledge about pre-stressed concrete.

SHORT DESCRIPTION

Design of reinforced cement concrete one-way & two-way slab, stair slab, column, wall footing, column footing and cantilever retaining wall; Pre-stressed concrete and Miscellaneous RCC structures.

DETAIL DESCRIPTION

Theory:

1. Understand the concept of floor/roof slab.

1.1 Describe different types of reinforced cement concrete floor/roof slab.
1.2 State the loads to be considered in designing reinforced cement concrete floor slabs.
1.3 State the way to determine the dead load and live load.
1.4 Compare between one-way and two-way solid reinforced cement concrete slab.

2. Understand the principles of designing reinforced cement concrete one-way solid slab.

2.1 State the minimum thickness of reinforced cement concrete one-way slab.
2.2 Explain the necessity of shrinkage and temperature reinforcement in one-way slab.
2.3 Mention the steps to be followed in designing reinforced cement concrete one-way slab.
2.4 Design reinforced cement concrete one-way slab with supplied data in both WSD and USD methods.
2.5 Design a reinforced cement concrete cantilever slab in WSD method.
2.6 Design a one-way reinforced brick (RB) slab in WSD method.
2.7 Calculate the load carrying capacity of a one way slab with supplying data.

3. Understand the principles of designing reinforced cement concrete two-way slab.

3.1 State the minimum thickness of reinforced cement concrete two-way slab.
3.2 Explain the use of bending moment coefficient in designing reinforced cement concrete two way slab.
3.3 State the meaning of column strip and middle strip in two-way slab.

3.4 Design reinforced cement concrete two-way slab with supplied data in WSD method.
3.5 Explain the necessity of corner reinforcement in two-way slab.
3.6 Design a reinforced cement concrete balcony slab in WSD method.
3.7 Calculate the load carrying capacity of a two way slab with supplying data.

4. Understand the principles of designing reinforced cement concrete stair slab.

4.1 List various types of stair.
4.2 Mention the relation between tread and rise according to American standard and BNBC.
4.3 State the formula used in calculating weight of waist slab and steps.
4.4 Design reinforced cement concrete stair slab in WSD method.

5. Understand the principles of designing reinforced cement concrete Axially Loaded columns.

5.1 Describe different types of reinforced cement concrete column.
5.2 State the minimum size and minimum number of rod required for tied column and spiral column.
5.3 Explain the effective length of column.
5.4 Describe reduction factor of column.
5.5 Determine the spacing of lateral ties and spirals of column.
5.6 Determine the safe load on column (by using table).
5.7 Design a reinforced cement concrete tied column.
5.8 Design a reinforced cement concrete spiral column.

6. Understand the principles of designing reinforced cement concrete footing.

6.1 Determine the width of foundation bed of spread footing and RCC wall footing.
6.2 Describe the critical section for moment, shear and bond of brick wall footing and concrete wall footing.
6.3 Design a reinforced cement concrete footing for brick wall.
6.4 Describe the critical section for moment, shear and bond of concrete column footing.
6.5 Design the independent reinforced cement concrete square and rectangular column (blocked) footing.
6.6 Design the independent reinforced cement concrete square and rectangular column (sloped) footing.
6.7 Design of a combined footing.

7. Understand the principles of designing reinforced cement concrete cantilever retaining wall.

7.1 Describe the different component of a cantilever retaining wall.
7.2 Calculate the earth pressure related to cantilever non-surcharged retaining wall.
7.3 Find out the position of the resultant pressure of weight of retaining wall and earth pressure for non-surcharged retaining wall.
7.4 Explain the factors affecting the stability of cantilever retaining wall.
7.5 Determine the maximum and minimum pressure on the foundation bed due to different condition of eccentricity.
7.6 Design a reinforced cement concrete cantilever non-surcharged retaining wall.
7.7 Check the stability of cantilever non-surcharged retaining wall.

8. Understand the concept of pre-stressed concrete.

8.1 Define pre-stressed concrete.
8.2 Compare the advantages and limitations of reinforced cement concrete and pre-stressed concrete.
8.3 Describe the properties of concrete used for pre-stressed concrete.
8.4 Describe the properties of steel strand used for pre-stressed concrete.

8.5 Describe the procedure of pre-stressing the wire/tendon pre-tensioning.
8.6 Describe the procedure of pre-stressing the wire/tendon post-tensioning.
8.7 Mention the uses of pre-stressed concrete in Bangladesh.

9. Understand the typical drawing of miscellaneous reinforced cement concrete structure.

9.1 Explain the Re-bar placement of the following structures:

a. Raft/Mat foundation
b. Combined footing and cantilever footing
c. Pile with pile cap
c. Basement floor
d. Column and Beam Connection
e. Two-span box culvert
f. Bridge deck slab of T-beam
g. Counterfort retaining wall
h. Flat slab & Flat plate slab
i. Ramp
j. Helical stair slab
k. spiral stair slab
l. Overhead water tank of rectangular and dome shaped.
m. Under ground water reservoir of square, rectangular and circular shape.

PRACTICAL:

1. Prepare a model of one-way slab reinforcement as per drawing (simply supported/Semi-continuous/Fully continuous).
2. Prepare a model of cantilever slab reinforcement as per drawing.
3. Prepare a model of two-way slab reinforcement as per drawing.
4. Prepare a model for RCC stair slab reinforcement as per drawing.
5. Prepare a model of square/rectangular tied column with footing as per drawing.
6. Prepare a model of spiral column with footing as per drawing.
7. Prepare a model for RCC wall footing as per drawing.
8. Prepare a model for cantilever retaining wall as per drawing.

Note-1: Step to be followed:

* Collect the MS rod.
* Straight the MS rod.
* Cut the MS rod in required length.
* Remove the rust of the rod if any.
* Bend the MS rod as required.
* Make hooks according to design code.
* Arrange the main rod and binder rod.
* Bind each of the joints with galvanized iron wire.
* Check the properness of the fabrication works.

10. Class teacher may arrange a field/industry visit to see the practical reinforcement fabrication works of any RCC structure or any construction project.

Step to be followed:

* Make suitable groups of student.
* Collect video camera.
* Take necessary photograph.
* Make a report and present by multimedia projector.
* Open discussion among the student of others groups.

REFERENCE BOOKS

1 Design of Concrete Structure - Winter, Urquahert and Nelson
2 Treasure of RCC - Shushil Kumar
3 Design of RCC Structure - Abul Faraz Khan
4 Simplified Design of Reinforced Concrete - H Parker

66475 Water Resource Engineering

T	P	C
2	3	3

AIMS

- To provide understanding on the influence of the climatic condition of Bangladesh on its ground water and surface water flow
- To provide understanding of recharging of underground water and ascertain its necessity in Bangladesh.
- To enable to select a suitable source of water and method of irrigation for particular situation.
- To enable to select a suitable method of drainage for particular situation.
- To enable to select a suitable method for control of rivers and flood in Bangladesh.
- To understand rain water harvesting.

SHORT DESCRIPTION

Sources of water; Rainfall and run-off; Lifting of underground water; Storing and Recharging of ground/rain water; Irrigation and its effect; Well irrigation; Water requirements for crops; and quality of irrigation water; Storage reservoir; Dam and dyke; Irrigation canals; Silt deposit; Scouring; Canal works; Drainage; River training works; Flood and flood management and flood control; Irrigation projects in Bangladesh.

DETAIL DESCRIPTION

Theory:

1. Understand different hydrological terms.

1.1 Explain with neat sketch the hydrological cycle.
1.2 Explain the meaning of the following: Rainfall, Rainfall intensity and duration frequency relationship Run-off, Infiltration, Evaporation, Transpiration, Evapo-transpiration, Permeable and impermeable strata of soil, Ground water table, Precipitation, Aquifer.
1.3 Mention the characteristics of rainfall and run-off in Bangladesh.
1.4 Describe with sketches the various types of rain gauges.
1.5 List the factors affecting the run-off an area.
1.6 Determine average annual run-off of a catchments area from given data.

2. Understand the features of a well and recharging of ground water.

2.1 State the following terms with neat sketches: Cone of depression, Circle of influence, Draw down curve.
2.2 Express how to determine the yield of a well.
2. 3 Solve the problems regarding lifting water from well.
2.4 Define storing and recharging of ground water/rain water.
2.5 Mention the condition of recharging of ground water is required.
2.6 List the methods of recharging of ground water.
2.7 Mention the advantages and disadvantages of recharging of ground water.
2.8 Predict the need for recharging of ground water in Bangladesh.

3. Understand the significance of irrigation.

3.1 Explain the necessity of irrigation in Bangladesh.
3.2 Mention the benefits of irrigation.
3.3 Describe about the present development of irrigation in Bangladesh.
3.4 Name different types of irrigation including sub-divisions.
3.5 Describe flow irrigation through flexible pipe.
3.6 Differentiate canal or direct irrigation with reservoir (tank) or indirect irrigation.
3.7 Describe different methods for lifting water for irrigation manually and by power.
3.8 Mention the advantages and disadvantages of well irrigation.
3.9 Explain the necessity of tube-well irrigation in Bangladesh.
3.10 Mention the advantages and disadvantages of tube-well irrigation.

4. Understand the concept of storage reservoirs.

4.1 State the meaning of storage reservoir.
4.2 Explain the necessity of storage reservoir
4.3 Mention the requirements of an ideal reservoir.
4.4 Explain the meaning of commendable area and irrigable area.
4.5 Calculate the capacity of a storage reservoir by using appropriate methods.
4.6 Mention the factors that determine the height of the dam of a reservoir.
4.7 Mention the section of a dam of reservoir with different components.

5. Understand the features of dam, dyke and irrigation canal.

5.1 State dam, core wall, dyke and irrigation canal.
5.2 Mention the favorable conditions for location of an earthen dam/ masonry dam.
5.3 Mention the advantages and limitations of an earthen dam/masonry dam.
5.4 Describe the construction procedure of an earthen dam/dyke.
5.5 Mention the remedies for preventing the failure of an earthen dam/dyke.
5.6 Differentiate between dam and dyke.
5.7 State main, branch, distributor, field canal and canal lining.
5.8 Mention the points to be considered in fixing the alignment of an irrigation canal.
5.9 Describe with sketches the distributor system of irrigation canals.
5.10 Describe the steps for excavating a new canal and old canal.

6. Understand silt deposition & scouring.

6.1 State river morphology, silt, siltation and scouring.
6.2 Mention the causes of siltation.
6.3 Mention the merits and demerits of siltation.
6.4 Describe the methods of preventing silt deposition into river and canal.
6.5 Describe the removal methods of silt from the river and canal.
6.6 Differentiate between silt excluder and silt ejector.
6.7 Describe the effect of scouring.
6.8 Describe the methods of preventing scouring.

7. Understand the features of head works.

7.1 State the meaning of head works.
7.2 Name the different components of a head works.
7.3 Explain the functions of each of the component of a head works.

8. Understand the principles of drainage.

8.1 State the meaning of drainage.
8.2 Mention the different methods of drainage.
8.3 State the meaning of cross drainage works.
8.4 Mention the functions of cross drainage works.
8.5 Differtiate between aqueduct and super passage.
8.6 Mention the need for drainage in Bangladesh.

9. Understand the necessity of river training works.

9.1 State the meaning of river training.
9.2 Outline the objectives of river training works.
9.3 Mention the different methods of river training works.
9.4 Mention the functions of guide bank, groyne, spur, afflux, marginal bund and stone apron.
9.5 Explain the necessity of river training works in Bangladesh.

10. Understand the concept of flood and flood control.

10.1 State the meaning of flood.
10.2 Mention the causes of flood.
10.3 Mention the different methods of controlling flood.
10.4 Specify the causes of flood in Bangladesh.
10.5 Describe suitable method(s) for flood control in Bangladesh.

10.6 State coastal embankment project and inland river embankment project.
10.7 Describe the flood forecasting procedure in Bangladesh.

11. Understand different irrigation projects in Bangladesh.

11.1 Write short history of irrigation in Bangladesh.
11.2 Give an overview of Ganga-Kapatakhha (G-K) Project.
11.3 Give an overview of Teesta Barrage Project.
11.4 Give an overview of Chalan Beel Development Project.
11.5 Give an overview of Chandpur Irrigation Project.
11.6 Give an overview of Barisal Irrigation Project.
11.7 Give an overview of North Bengal Deep Tube Well Project.
11.8 Give an overview of Pabna Irrigation and Flood Control Project.

PRACTICAL:

1. Measure rainfall by rain gauge and determine the intensity of rainfall.
2. Disassemble and assemble common hand pump/Tara pump.
3. Install hand pump/Tara pump.
4. Draw neat sketch of cone of depression with draw down and circle of influence.
5. Draw neat sketch of rain gauges commonly used in Bangladesh.
6. Draw the section of a dam of a reservoir with components.
7. Draw neat sketch of distribution system of irrigation.
8. Draw neat sketch of head works with components.
9. Draw neat sketch of guide bank, groyne, spur, afflux, marginal bund and stone apron.
10. Prepare a model for a typical irrigation project.
11. Visit an irrigation and flood control project in Bangladesh.

REFERENCE BOOKS

1. Hydrology– Raghunath
2. Irrigation Engineering and Hydraulic structure– Santosh Kumar Garg
3. Introductory Irrigation– B C Punmia
4. Irrigation – Esrailson
5. Irrigation Engineering and Hydraulic Structure - Santosh Kumar Garg
6. Introductory Irrigation Engineering - B C Punnia
7. www.bwdb.gov.bd (For idea about mentioned project)

68873 Construction Management & Documentation

T	P	C
2	3	3

AIMS:

- To be able to understand the modern techniques of construction management.
- To be able to understand the operational research & site layout and organization.
- To be able to understand the mobilization of materials in construction management.
- To be able to understand the quality and cost control.
- To be able to understand the Pre-tender and Post-tender planning.
- To be able to prepare pre-qualification documents.
- To be able to evaluate pre-qualification documents.
- To be able to prepare technical specifications.
- To be able to prepare financial evaluation.
- To be able to prepare contract clauses.
- To be able to prepare tender documents.
- To be able to prepare contract documents.
- To be able to prepare Quality control document.
- To be able to understand the cost control.
- To be able to develop knowledge, skill and attitude of evaluating tenders and preparing comparative statement.

SHORT DESCRIPTION

Principles of management and construction; Organization of contracts department; Operational research; Site layout and organization; Mobilization of materials; Demobilization of STRUCTURE; Safety in construction; Quality and cost control; Codes and building by-laws; Tender; Pre-tender and Post-tender planning; Tender document; Tender notice; Instruction to tender; Contract clauses/condition of contract; Technical specifications of materials and works; Pre-qualification of contractors; Evaluation and comparative statement; Contract agreement.

DETAIL DESCRIPTION

Theory:

1. **Understand the principles of management and construction.**
   - 1.1 Define management.
   - 1.2 State the functions of management.
   - 1.3 Describe the planning and executive functions of management.
   - 1.4 Define construction management.
   - 1.5 Establish the relation between management. and construction management.
   - 1.6 Explain the necessity for scientific management in construction process.
   - 1.7 Describe the role of an engineer as a construction manager.
   - 1.8 List the organs of project management team (PMT).
   - 1.9 State the main objectives of a project management team.

2. Understand the organization of contracts department.

2.1 Define organization.

2.2 Describe organizational effectiveness in an organization.

2.3 State the staffing pattern in an organization of contract department.

2.4 Draw an organizational chart of a contracts department.

2.5 Describe the responsibilities and authorities of the components of contracts Department.

2.6 List different government engineering department in Bangladesh.

2.7 Explain the role and responsibilities of the following within the engineering Organization: i) Chief Engineer (CE), ii) Additional Chief Engineer (ACE), iii) Superintending Engineer (SE), iv) Executive/Divisional Engineer (XEN/DE), v) Sub-Divisional Engineer (SDE), vi) Asstt. Engineer (AE), vii) Sub-Asstt. Engineer(SAE), viii) Work Supervisor/Work Assistant.

2.8 Explain the need for relation and co-operation between site engineer and contractor's agent.

2.9 Describe the relation between-a. Site office and Head office, b. Contractor and Head office

2.10 Define consultancy services.

2.11 State the conditions for enlistment of consulting firm.

2.12 Describe the function and objectives of consultants.

3. Understand the operational research in construction management process.

3.1 Define operational research.

3.2 Explain construction stage, construction operation and construction schedule.

3.3 Describe the budget and flow-chart of money and materials.

3.4 Explain the method of calculating project time schedule.

3.5 Describe bar chart and its shortcoming and remedies.

3.6 State the necessity of network planning.

3.7 Classify network planning.

3.8 Describe the procedure construction network.

3.9 Define critical path method (CPM) and project evaluation & review technique (PERT).

3.10 Describe the process of construction CPM network.

3.11 Describe the process of drawing a PERT network.

3.12 State advantages of CPM and PERT network.

3.13 Distinguish between CPM and PERT network.

3.14 Describe the preparation of CPM and PERT network for a 6-storiedbuilding project.

3.15 Explain the following terms:

a. Event

b. Activity

c. Duration

d. Dummy activity

e. Total float

f. Free float

4. Understand the site layout and mobilization of materials in construction management.

4.1 State different features of a site layout plan.

4.2 Draw a site layout plan of a construction site organization.

4.3 Explain the importance of site security.

4.4 Define mobilization of materials and equipment.

4.5 Explain the procedure of receiving materials on site.

4.6 Draw a line plan of a material warehouse within the site.

4.7 Explain the procedure of removing materials from the site.

5. Understand the safety measures to be taken in construction management.

5.1 Define safety measure.

5.2 State the nature of accidents in construction work.

5.3 Describe objectives, application and policy planning of safety program in construction work.

5.4 Draw a typical organization chart for safety group.

5.5 Describe the responsibility of employers and employees in respect of safety measure.

5.6 State the general safety requirements in construction works.

5.7 State different signals, signs and tags used in safety work.

5.8 Describe necessary safety measure in working field. Such as - material handling, storage and disposal, handling of machinery and mechanical equipment and operating motor during work in the outer edge of a structure.

5.9 Explain the necessity of safety training for employees.

5.10 Explain the process of preparation of accident report.

5.11 Prepare an accident report to the employer.

6. Understand the quality control and cost control process in construction management.

6.1 Define quality control and cost control.

6.2 Describe the effects of lack of adequate quality control.

6.3 State the effects and benefit of quality control for the contractor, the designer and consultants.

6.4 Draw a flow diagram of a quality plan.

6.5 Describe the responsibilities to control the quality of construction of a) the client, b) the designer, c) the manufacturer, d) the contractor and f) the supervisor.

6.6 Mention the requirements for an effective cost control system.

6.7 State the phases of a management cost and control system.

6.8 Mention the procedural steps of management cost control system (MCCS).

6.9 Explain cost reduction cycle.

7. Understand the concept of tender, codes and building by-laws in practice.

7.1 Define tender or bid.

7.2 Mention different types of tender.

7.3 State the meaning of local competitive bid (LCB) and international Competitive bid (ICB).

7.4 Mention different building codes used in Bangladesh

7.5 Mention building by-laws practiced in the country.

8. Understand the pre-tender and post-tender planning.

8.1 Define pre-tender planning.

8.2 State the objectives of pre-tender planning.

8.3 List the activities of pre-tender planning.

8.4 Define post-tender planning.

8.5 List the activities of post-tender planning.

8.6 Explain anticipation of award.

8.7 Define evaluation of contract.

8.8 Explain the silent features of evaluation. of contract.

9. Understand the concept of tender documents.

9.1 State the meaning of tender document

9.2 Mention the characteristics of ideal tender document

9.3 Describe the procedure of preparation of tender document.

9.4 Explain different methods of contract for works.

9.5 Explain the following Contents of the tender documents:

- Tender Notice
- Instruction to Tenderers (ITT)
- Bill of Quantities (BOQ)
- Construction time period
- Tender Form
- Form of Agreement
- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Technical specifications
- Date of Site Possession and Mobilization
- Period of commencement of work
- Period of Completion
- Security deduction
- Liquidated damages and penalty for delay in completion of the work
- Condition of engagement of a sub-contractor.
- Quality control clauses
- Time schedule of work
- Day-work
- Arbitration
- Extension of completion period
- Termination
- Maintenance period

10. Understand the meaning of tender notice.

10.1 Define tender notice.

10.2 Mention different types of tender notice.

10.3 Mention the particulars needed for a tender notice.

10.4 State the meaning of comparative statement.

10.5 Mention the advantage of preparing comparative statement.

10.6 Define pre-bid meeting.

11. Understand the Instruction to Tenderers (ITT).

11.1 Interpreter the following terms used in ITT:

(a) Scope of Tender

(b) Source of Funds

(c) Eligible Bidders

(d) Qualification of the Bidder

(e) Amendment of Tender Documents

(f) Language of Tender

(g) Documents Comprising the Tender

(h) Tender Prices

(i) Currencies of Tender and Payment
(j) Tender Validity
(k) Tender Security
(l) Format and Signing of Tender
(m) Sealing and Marking of Tenders
(n) Deadline for Submission of Tenders
(o) Late Tenders
(p) Modification and Withdrawal of Tenders
(q) Tender Opening
(r) Evaluation of Contract
(s) Force major
(t) Earnest money/ Tender Security
(u) Award Criteria
(v) Performance security.

12. Understand the pre-qualification of contractors.

12.1 Define pre-qualification of contractors.
12.2 Describe the aim of prequalification of contractors
12.3 State the features of prequalification notice
12.4 Describe the procedure of preparation of pre-qualification Document.
12.5 Mention the prequalification criteria
12.6 Explain the procedure of preparation of evaluation criteria of pre-qualification document
12.7 Describe the process of evaluation of prequalification applications submitted by the intending contractors

13. Understand the evaluation and Comparative Statement of Tenders

13.1 Describe the tender opening procedure including preparation of opening memo.
13.2 Explain the process of examination of tenders and determination of responsiveness
13.3 Explain the process of evaluation and comparison of tenders.

14. Understand the Concept of e-tendering.

14.1 Define e-tender.
14.2 Describe the purpose of e-tender
14.3 Mention the advantage and disadvantage of e-tender
14.4 Describe the process of preparing e-tender.
14.5 Describe the importance of e-tendering in Bangladesh.

15. Understand the recent public procurement rules(PPR) implemented by the govt. of Bangladesh

15.1 State the back ground of PPR development in Bangladesh.
15.2 State the meaning of the following: PPR, PPA, ITT, TDS, GCC, PCC, NOA, BOQ, TOC, POC, TEC, PEC, HOPE, CS, OTM, RFQ, DPM, and CPTU.
15.3 Describe the preparation of standard tender document for works.
15.4 Describe the preparation of standard tender document for goods.
15.5 Describe the process of tender submission.
15.6 Describe the process of evaluation of tender documents.

PRACTICAL:

1. Draw a neat sketch of a construction site showing different components.
2. Prepare a construction schedule of a 6-storied residential building.
3. Prepare a CPM network for a given data.
4. Prepare a PERT network for a given data.
5. Prepare a PCP of 6-storied building project for a given data.
6. Prepare an accident report for an accident to the employer.
7. Prepare a tender notice for a particular work.
8. Prepare a tender document for particular work.
9. Prepare a pre-qualification document for contractor selection (particular work).
10. Prepare a comparative statement for particular bid.
11. Write a notification of award.

REFERENCE BOOKS

1 Introduction to Building Management (Fifth Edition) - RE Calvert

3 Construction Management (Second Edition) - PP Dharwadker

4 The Site Agents Hand Book - RHB Ranns

5 Building Organization & Procedures (Second Edition) - G Froster

6 Building Production and Project Management - R A Burgess and G White

7 The Resume of Building Construction & Management with CPM (Construction Concept) - Mohammed Ali Siddiquee

65853 **INNOVATION & ENTREPRENEURSHIP** **T P C**
2 0 2

AIMS

- To be able to understand the concept of entrepreneurship & entrepreneur.
- To be able to understand the concept of environment for entrepreneurship.
- To be able to understand the sources of venture ideas in Bangladesh.
- To be able to understand the project selection.
- To be able to understand business planning.
- To be able to understand the insurance and premium.
- To be able to understand the MDG & SDG.

SHORT DESCRIPTION

Concepts of entrepreneurship & entrepreneur; Entrepreneurship & economic development; Environment for entrepreneurship; Entrepreneurship in the theories of economic growth; Sources of ventures ideas in Bangladesh; Evaluation of venture ideas; Financial planning; Project selection; Self employment; Entrepreneurial motivation; Business plan; Sources of assistance & industrial sanctioning procedure; Concept of SDG; SDG 4,8 .

DETAIL DESCRIPTION

Theory :

1. Understand the basic concept of entrepreneurship & entrepreneur.

1.1 Define entrepreneurship & entrepreneur.
1.2 Discuss the characteristics and qualities of an entrepreneur.
1.3 Mention the classification of entrepreneur.
1.4 Discuss the necessity of entrepreneurship as a career.
1.5 Discuss the prospect of entrepreneurship development in Bangladesh.

2. Understand the concept of entrepreneurship and economic development.

2.1 Define economic development.
2.2 Discuss the economic development process.
2.3 Discuss the capital accumulation or rate of savings.
2.4 Discuss the role of entrepreneur in the technological development and their introduction into production Process.
2.5 Discuss the entrepreneur in the discovery of new product.
2.6 Discuss the discovery of new markets.

3. Environment for entrepreneurship development:

3.1 Define the micro environment.
3.2 Discuss individual income, savings and consumption.
3.3 Define macro environment.
3.4 Discuss political, socio-cultural, economical, legal and technological environment.
3.5 Difference between micro and macro environment .

4. Understand the concept of entrepreneurship in the theories of economic growth.

4.1 Define entrepreneurship in the theories of economic growth.
4.2 Discuss the Malthusian theory of population and economic growth.
4.3 Discuss the stage theory of growth.
4.4 Discuss the Schumpeterian theory of economic development.
4.5 Discuss the entrepreneurship motive in economic development.

5. Understand the sources and evaluation of venture ideas in Bangladesh.

5.1 Define sources of venture ideas in Bangladesh.
5.2 Discuss different types of sources of venture ideas in Bangladesh.
5.3 Define evaluation of venture ideas.

5.4 Discuss the factors that influence the selection of venture idea.

6. Understand the concept of project selection and financial planning.

6.1 Define project.
6.2 Discuss the idea of project.
6.3 Describe the guide lines for project ideas.
6.4 Discuss the sources of project ideas.
6.5 Discuss the evaluation of project ideas.
6.6 Describe the technical aspect of project.
6.7 Define financial planning.
6.8 Discuss the long term financial plan.
6.9 Discuss the short term financial plan.

7. Understand the concept of self employment.

7.1 Define self employment.
7.2 Describe different types of employment.
7.3 Describe the importance of business as a profession.
7.4 Discuss the reasons for success and failure in business.

8. Understand the business plan and the concept of the environment for entrepreneurship.

8.1 Define business plan.
8.2 Describe the importance of business plan.
8.3 Discuss the contents of business plan.
8.4 Define environment of business.
8.5 Describe the factors which effect environment on entrepreneurship

9. Understand the concept of sources of assistance & industrial sanctioning procedure.

9.1 Define sources of assistance.
9.2 Describe different types of sources of assistance.
9.3 Discuss the aid of sources.
9.4 Discuss the industrial policy.
9.5 Define foreign aid.

10. Understand the insurance and premium.

10.1 Define insurance and premium
10.2 Describe the essential conditions of insurance contract.
10.3 Discuss various types of insurance.
10.4 Distinguish between life insurance and general insurance.

11. Understand the concept of Sustainable Development Goals (SDG)

11.1 Define Sustainable development
11.2 State UN targets of MDG
11.3 State UN targets of SDG
11.4 Describe the importance of SDG
11.5 Explain the objectives of SDG
11.6 State the Challenges to achieve SDGs
11.7 Explain the actions to face the challenges of SDGs
11.8 State the of 7^{th} 5 years plan
11.9 Mention the link of 7^{th} 5 years plan with SDGs
11.10 Write down the 5 ps of sustainable development goals

12. Understand SDG 4,8 and 17

12.1 Describe SDG 4 and its targets
12.2 State the elements of Quality education for TVET
12.3 Describe the gender equality and equal access of TVET for economic growth
12.4 Describe SDG 8 and its targets

12.5 Explain Green development, Green Economy, Green TVET & Green Jobs

12.6 Explain the role an entrepreneur for achieving SDG

Reference book :

1. A hand book of new entrepreneur-by p.c jain.
2.A manual on business opportunity Identification and selection-by j.B patel and S S modi.
3.Uddokta unnoyan Nirdeshika -Md.Sabur khan.
4.Entrepreneurship- bashu and mollik.
5.Business Entrepreneurship-kage faruke.
6. Website, Youtube and Google