



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Sher-E-Bangla Nagar

Dhaka-1207.

**04-YEAR DIPLOMA IN ENGINEERING CURRICULUM
COURSE STRUCTURE & SYLLABUS
(PROBIDHAN-2022)**

CIVIL TECHNOLOGY

TECHNOLOGY CODE: 64

5TH SEMESTER

(Effective from 2022-2023 Academic Sessions)

DIPLOMA IN ENGINEERING CURRICULUM

COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: CIVIL TECHNOLOGY (64)

(5th SEMESTER)

Sl. No.	Subject		Period Per Week		Credit	Marks Distribution						Grand Total
						Theory Assessment			Practical Assessment			
	Code	Name	Theory	Practical		Continuous	Final	Total	Continuous	Final	Total	
1	25852	Industrial Management	2	-	2	40	60	100	-	-	-	100
2	26451	Foundation Engineering	2	3	3	40	60	100	25	25	50	150
3	26452	Civil CAD-II	1	6	3	20	30	50	50	50	100	150
4	26453	Surveying-III	2	3	3	40	60	100	25	25	50	150
5	26454	Theory of Structure	2	3	3	40	60	100	25	25	50	150
6	26455	Water Supply Engineering	2	3	3	40	60	100	25	25	50	150
7	26456	Hydraulics	2	3	3	40	60	100	25	25	50	150
Total			13	21	20	260	390	650	175	175	350	1000

Subject Code	Subject Name	Period per Week		Credit
25852	INDUSTRIAL MANAGEMENT	T	P	C
		2	0	2

Rationale	<p>As mid-level manager, engineering diploma graduates are responsible for proper and most efficient interaction of 6 M'S: man, machine, material, money, method (SOP or process) and market with a focus that will depend on their position in the organization (production, planning, quality, maintenance, design, etc.).</p> <p>They first need to understand the type of management and organization they work in.</p> <p>As they work directly or indirectly with manufacturing, therefore they need to have knowledge, skills and attitudes on production, planning, productivity improvement, new systems such as lean manufacturing and understand how production integrates in the overall supply chain management.</p> <p>They deal with people either as a supervisor, assistant manager or by leading transversal projects, they should know their role concerning human resources management and development. In their daily work, they must use a suitable leadership style, assign and monitor work, solve problems, support motivation to change of their teams when they implement new methods and systems.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> State the roles and responsibilities of a mid-level manager within the organization <input type="checkbox"/> Differentiate various management systems and organizations <input type="checkbox"/> Describe the manufacturing process ensuring productivity, quality, cost and safety <input type="checkbox"/> State the types of production planning <input type="checkbox"/> Explain productivity improvement factors while controlling cost <input type="checkbox"/> Describe new trends of production management systems <input type="checkbox"/> Identify mid-level manager roles in the human resources management and development <input type="checkbox"/> Select the suitable leadership style depending on the situations and people <input type="checkbox"/> Identify the steps of work assignment based on goals to achieve while supporting changes <input type="checkbox"/> Describe the steps of problem solving and decision making

DETAIL DESCRIPTION (THEORY):

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	<p>FUNDAMENTALS OF ORGANIZATION</p> <p>1.1 Explain the purpose of an organization. 1.2 Define management organization. 1.3 Describe various types and features of organization structures. 1.4 Explain authority, responsibility, duties and delegation of authority. 1.5 Define span of supervision.</p>	2	4
2.	<p>FUNDAMENTALS OF MANAGEMENT</p> <p>2.1 Explain the functions of management. 2.2 Relate administration, organization and management. 2.3 Describe different types of management and in which context they apply. 2.4 Define the specificities of industrial management.</p>	2	4
3.	<p>PRODUCTION MANAGEMENT</p> <p>3.1 Define production management . 3.2 State functions of production management. 3.3 Describe “5p”. 3.4 Mention applications of “5p”. 3.5 Define cost control-methods. 3.6 Define inventory & inventory control. 3.7 Describe the fundamentals of maintenance management. 3.8 Explain the importance of quality system. 3.9 Explain the components of quality system</p>	5	8
4	<p>PRODUCTIVITY IMPROVEMENT</p> <p>4.1 Define Productivity. 4.2 List factors affecting industrial productivity. 4.3 Describe productivity improvement techniques. 4.4 Describe the lean manufacturing approach. 4.5 Explain the concept of Just in Time.</p>	3	6
5	<p>PLANNING</p> <p>5.1 Discuss importance of planning. 5.2 Explain the steps in planning. 5.3 Explain the factors affecting on planning. 5.4 State different types of production planning and control. 5.5 Describe the way to manage personal time.</p>	4	7
6	<p>SUPPLY CHAIN MANAGEMENT</p>	3	4

Unit	Topics with Contents	Class (1 Period)	Final Marks
	<p>6.1 Define supply chain management.</p> <p>6.2 Explain the components of supply chain management.</p> <p>6.3 Explain production integration into supply chain management.</p>		
7.	<p>HUMAN RESOURCES MANAGEMENT AND DEVELOPMENT (HRM-HRD)</p> <p>7.1 Describe the main functions in human resources management (HRM).</p> <p>7.2 Describe the main functions in human resources development (HRD).</p> <p>7.3 Explain the role of manager in the recruitment process.</p> <p>7.4 Explain the role of manager in the training process.</p> <p>7.5 Explain the role of manager in the performance management system.</p> <p>7.6 Mention the components of compensation and benefits system.</p>	3	6
8.	<p>LEADING A TEAM</p> <p>8.1 Define leadership.</p> <p>8.2 Identify personality traits impacting leadership style.</p> <p>8.3 Discuss the types of leadership.</p> <p>8.4 Define motivation and motivational cycle.</p> <p>8.5 State the importance of motivation.</p> <p>8.6 List motivation drivers based on Maslow, Herzberg adapted to various generations</p> <p>8.7 State concepts of Theory-X, Theory-Y and Theory-Z</p>	3	6
9.	<p>WORK ASSIGNMENT</p> <p>9.1 List different types of leadership styles.</p> <p>9.2 Describe the leadership style adapted to the work assignment and delegation.</p> <p>9.3 State SMART goal.</p> <p>9.4 Set SMART goals to support work assignment.</p> <p>9.5 Identify ways to reduce resistance to change during work assignment.</p>	4	8
10.	<p>PROBLEM SOLVING AND DECISION MAKING</p> <p>10.1 Mention the steps of problem solving.</p> <p>10.2 Explain tools used to analyze and solve problem addressing the 5M components.</p> <p>10.3 Define decision making.</p> <p>10.4 Discuss different types of decision-making process.</p> <p>10.5 Describe the steps in decision making.</p>	3	7
	Total	32	60

Necessary Resources (Tools, equipment and Machinery):

SI	Item Name	Quantity (piece/s)
01	Case studies, examples, exercises related documents	One for each student
02	Project templates	One for each student

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
01.	Principles of Management	Dr. Md. Mainul Islam and Dr. Abdul Awal Dhan,	Bangladesh Open University.
02.	Personnel Management and Industrial Relation.	Mohammad Mohiuddin	NIDS Publication Co, Dhaka.
03.	Production Operations Management: The Handbook	Ronald P Bizzle Jr	Independently published (January 31, 2023)
04.	How To Implement Lean Manufacturing, Second Edition 2nd Edition	Lonnie Wilson	McGrawHill; 2nd edition (March 22, 2015)
05.	The Toyota Way, Second Edition: 14 Management Principles from the World's Greatest Manufacturer Hardcover	Jeffrey K Liker	McGrawHill; 2nd edition (December 1, 2020)
06.	Fast er, Bet ter, Cheaper i n the H istory of Manufacturing 1st Edition	Chr i st oph Roser	Product i vity Pr; 1st edition (August 5, 2016)
07.	Supply Chain Management , I nvent ory Control , Human Resource Management , and Customer service (Louis Bevoc Series of Educational and I nfor mat i onal Books)	Louis Bevoc	Cr eat eSpace I ndependent Publ i shing Pl at f or m (Sept ember 4, 2016)
08.	Bul l et pr oof Pr obl em Sol vi ng: The One Ski l l That Changes Everyt hi ng	Char l es Conn	Wl ey; 1st edition (Mar ch 6, 2019)
09.	The Mini at ure Gui de t o Cri t i cal Thi nki ng Concepts and Tool s	Ri char d Paul and Li nda El der	The Foundat i on f or Cri t i cal Thi nki ng; E ight h edition (Sept ember 20, 2019)
10.	Leadership and the One Minute Manager: Increasing Effectiveness Through Situational Leadership	Ken Blanchard, Patricia Zigarmi, Drea Zigarmi	William Morrow; Updated edition (October 15, 2013)
11.	Effective Delegation of Authority: A (Really) Short Book for New Managers	Hassan Osman	Independently published (May 7, 2019)
12.	The Human Element: Overcoming the Resistance That Awaits	Loran Nordgren, David Schonthal	Wiley; 1st edition (September 28, 2021)
13.	The 7 Habits of Highly Effective People	Stephen R. Covey	Free Press (1989)
14.	ব্যবস্থাপনা	মোহাম্মদ খালেবুজ্জামান	দি যমুনা পাবলিশার্স
16.	কলেজে আরও ভালো কীভাবে করা যায়	সম্পাদকমন্ডলী	নায়েম, ঢাকা

17.	শিল্প প্রতিষ্ঠান উৎকর্ষ অর্জন	সম্পাদকমন্ডলী	নায়েম, ঢাকা
-----	-------------------------------	---------------	--------------

Website References:

SI	Web Link	Remarks
01.	www.coachinforleaders	Podcast on leadership skills
02.	https://essentialcomm.com/	Podcast on coaching
03.	https://www.manager-tools.com/	Podcast on management
04.	https://www.shrm.org/	Website of the most important HR association in USA
05.	https://www.makingchips.com/	Podcast on manufacturing

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
26451	Foundation Engineering	T	P	C
		2	3	3

Rationale	<p>Diploma in Civil Engineering is an ancient discipline of engineering sector. Without Diploma in Civil Engineering no development can be achieved. It has many branches. Among all branches Foundation Engineering is the most important branch, because every structure should have a firm foundation. So, it is vital subject of Diploma in Civil Engineering. To perform about this task, it is essential that students should have knowledge, skills and attitude of various sub components of buildings like foundations. Diploma in Civil Engineering students know about various types of foundation and its characteristics, soil stabilization, bearing capacity of soil, anchor, excavating and bracing, damages of construction operations after complete this course. So, it is very important subject for Diploma in Civil Engineering Students.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. State foundation, foundation engineering & the factors governing the Depth of foundation. 2. Illustrate the meaning of soil stabilization & the different process of soil Stabilization. 3. Describe the process to determine the bearing capacity of soil. 4. Explain different types of Piles. 5. Discuss different types of Anchors. 6. Explain foundation on rock. 7. Illustrate sheeting and bracing for shallow excavation & deep excavation. 8. State the meaning of sheet pile, coffer dam and bulk head. 9. Describe the process to determine the embedded length of cantilever Sheet pile in cohesive soil & non-cohesive soil. 10. Solve the problems relating cantilever sheet pile and anchored Bulkhead. 11. Illustrate damage for construction operations.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Perform the stabilization of soil by cement-sand method & by sand pile method. 2. Determine the bearing capacity of a test pile. 3. Prepare the model of pile foundation, raft foundation & pier . 4. Perform the Standard Penetration Test (SPT). 5. Test the bearing capacity of soil in the field. 6. Perform field visit.

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	FOUNDATION AND FOUNDATION ENGINEERING 1.1 Define foundation and foundation engineering. 1.2 Mention the requirements of a appropriate Foundation. 1.3 State the classification of foundation. 1.4 Mention the factors governing the depth of Foundation. 1.5 Explain the steps to select the type of Foundation. 1.6 Illustrate the necessity of bearing capacity and Settlement to select the type of foundation. 1.7 Describe the design load to select the type of Foundation.	3	7
2	SOIL STABILIZATION 2.1 State the meaning of soil stabilization. 2.2 Mention the various method of soil Stabilization. 2.3 Describe the process of addition and removal of Soil particles for soil stabilization. 2.4 Explain the soil stabilization by drainage. 2.5 Illustrate the process of sand piling. 2.6 Describe the process of soil cement stabilization.	4	7
3	BEARING CAPACITY OF SOIL 3.1 Define the bearing capacity and ultimate Bearing capacity of soil. 3.2 Mention the Tarzagli's bearing capacity factors. 3.3 Express the equations to determine ultimate Bearing capacity of soil for square footing. 3.4 Calculate the ultimate bearing capacity of non Cohesive soil. 3.5 Illustrate the allowable bearing capacity of Cohesive soil. 3.6 Explain the allowable bearing capacity of non Cohesive soil. 3.7 Describe the method of plate bearing test. 3.8 Describe the method of Standard Penetration Test (SPT).	5	9

	<p>3.9 Calculate the allowable bearing capacity of soil.</p> <p>3.10 Explain the methods for improving bearing Capacity of soil.</p>		
4	<p>PILE FOUNDATION</p> <p>4.1 Define pile.</p> <p>4.2 Describe the classification of pile.</p> <p>4.3 Differentiate between pre-cast & cast -in -situ Pile.</p> <p>4.4 Describe methods of cast- in-situ and pre-cast Pile.</p> <p>4.5 Explain the bearing capacity of pile.</p> <p>4.6 Explain end bearing and skin friction pile.</p> <p>4.7 Describe the skin friction and negative skin Friction.</p> <p>4.8 Solve the problems for Pre-cast and Cast- in-situ Pile.</p>	5	9
5	<p>ANCHOR</p> <p>5.1 Define ground anchors.</p> <p>5.2 Explain the application procedure of anchor in non cohesive soil.</p> <p>5.3 Describe the anchor in stiff clay.</p> <p>5.4 State the advantage of anchoring.</p>	3	5
6	<p>FOUNDATION ON ROCK</p> <p>6.1 State the basis for design of foundation on rock.</p> <p>6.2 Describe foundation on un-weathered rock.</p> <p>6.3 Explain foundation on weathered rock.</p> <p>6.4 State the treatment of rock defects.</p> <p>6.5 Describe the process of excavation in rock.</p>	3	5
7	<p>EXCAVATING AND BRACING</p> <p>7.1 State open excavation with unsupported slope.</p> <p>7.2 Mention the necessity of sheeting and bracing.</p> <p>7.3 Illustrate sheeting and bracing for shallow Excavation.</p> <p>7.4 Describe sheeting and bracing for deep Excavation.</p>	2	6
8	<p>SHEET PILE, COFFERDAM AND BULKHEAD</p> <p>8.1 State the meaning of sheet pile, cofferdam and Bulk head.</p> <p>8.2 Mention the different types of sheet pile and Bulkhead with sketches.</p> <p>8.3 State the forces action on a bulkhead.</p> <p>8.4 Describe the process to determine the</p>	4	6

	<p>embedded length of cantilever sheet pile in Cohesive soil.</p> <p>8.5 Describe the process to determine the embedded length of cantilever sheet pile in Non- cohesive soil.</p> <p>8.6 State the process to design an anchored bulkhead using free earth support method for granular soil and Cohesive soil below dredge Line.</p> <p>8.7 Solve the problems related cantilever sheet pile And anchored bulkhead.</p>		
9	<p>DAMAGES OF CONSTRUCTION OPERATIONS</p> <p>9.1 Mention the damages of construction Operations.</p> <p>9.2 State the settlement for excavation.</p> <p>9.3 Explain the settlement for vibration.</p> <p>9.4 Describe the settlement due to lowering the Water table.</p> <p>9.5 State the displacement due to pile driving.</p>	3	6
	Total	32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>PERFORM THE STABILIZATION OF SOIL BY CEMENT-SAND METHOD</p> <p>1.1 Select the required tools and raw materials.</p> <p>1.2 Prepare the subgrade/work site.</p> <p>1.3 Mix cement and sand as per ratio with proper Water.</p> <p>1.4 Perform compaction.</p> <p>1.5 Perform curing.</p> <p>1.6 Maintain the record of performed job.</p>	2	3
2	<p>PERFORM THE STABILIZATION OF SOIL BY SAND PILE METHOD</p> <p>2.1 Select the required tools and raw materials.</p> <p>2.2 Prepare the work site.</p> <p>2.3 Prepare the sand pile with sand and water According to standard procedure.</p> <p>2.4 Clean the work site.</p> <p>2.5 Maintain the record of performed job.</p>	2	3
3	<p>DETERMINE THE BEARING CAPACITY OF A TEST PILE</p> <p>3.1 Select the pile.</p> <p>3.2 Collect the required tools and raw materials.</p>	2	3

	<p>3.3 Apply the load according to standard procedure.</p> <p>3.4 Record the data.</p> <p>3.5 Prepare a report.</p> <p>3.6 Maintain the record of performed job.</p>		
4	<p>PREPARE A MODEL OF PILE FOUNDATION</p> <p>4.1 Collect the required tools and raw materials.</p> <p>4.2 Prepare a model of pile foundation as per drawing.</p> <p>4.3 Check the accuracy of the work.</p> <p>4.4 Maintain the record of performed job.</p>	1	3
5	<p>PREPARE A MODEL OF RAFT FOUNDATION</p> <p>5.1 Collect the required tools and raw materials.</p> <p>5.2 Prepare a model of raft foundation as per drawing.</p> <p>5.3 Check the accuracy of the work.</p> <p>5.4 Maintain the record of performed job.</p>	1	1
6	<p>PREPARE A MODEL OF PIER</p> <p>6.1 Collect the required tools and raw materials.</p> <p>6.2 Prepare a model of pier as per drawing.</p> <p>6.3 Check the accuracy of the work.</p> <p>6.4 Maintain the record of performed job.</p>	1	1
7	<p>PERFORM THE STANDARD PENETRATION TEST</p> <p>7.1 Select the site.</p> <p>7.2 Collect the required tools and raw materials.</p> <p>7.3 Identify borehole location.</p> <p>7.4 Apply the load according to standard procedure.</p> <p>7.5 Record the data.</p> <p>7.6 Prepare a report.</p> <p>7.7 Maintain the record of performed job.</p>	3	5
8	<p>PERFORM FIELD TEST FOR BEARING CAPACITY OF SOIL</p> <p>8.1 Select the site.</p> <p>8.2 Collect the required tools and raw materials.</p> <p>8.3 Perform different types of soil test as required.</p> <p>8.4 Use bearing capacity of soil table according to standard procedure.</p> <p>8.5 Record the data.</p> <p>8.6 Prepare a report.</p> <p>8.7 Maintain the record of performed job.</p>	2	3
9	<p>PERFORM FIELD VISIT</p> <p>9.1 Select the field.</p> <p>9.2 Perform field visit for soil sample collection.</p> <p>9.3 Observe and record the data.</p> <p>9.4 Prepare a report & Power Point Presentation.</p>	2	3

	9.5 Perform Power Point Presentation. 9.6 Maintain the record of performed job.		
	Total	16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
1	<p>LIST OF HAND TOOLS AND RAW MATERIALS:</p> <p>HAND TOOLS Boning rods, Hammer, Line Pins, Trowel, Drill Rod, Water Level, Plumb Rule and Bob, Mixing Tools, Cordless drill, Crowbar, Digging bar, Gloves, Hoe, Iron pan, Ladder, Measuring box, Measuring tape, Rubber Boots, Safety glasses, Safety helmet, Scratchers, Spade, Knife.</p> <p>RAW MATERIALS Cement, Sand, Khoa, Water, Graph Paper, Drawing Paper, Eraser, Cock sheet, Pencil .</p>	
2	<p>LIST OF EQUIPMENT AND MACHINERY:</p> <p>Drop hammer, Reaction girder, Dial Gauge, Hydraulic jack , SPT Device & Accessories.</p>	

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Foundation Engineering	B.Peck and E.Hanson	
02	Principles of Foundation Engineering	Braja M. Das	
03	Soil Mechanics and Foundation Engineering.	K.R.Arora	Standard Publishers Distributors
04	Soil Mechanics & Foundation	B.C Punmia	
05	Construction and Foundation Engineering	Dr. J Jha, S K Sinha	Khanna Publishers
06	Advanced Foundation Engineering	V.N.S Murty	
07	LGED Manual for soil investigation		

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	https://www.bing.com/videos/riverview/relatedvideo	Search here with topics
02	https://www.bing.com/videos/riverview/relatedvideo	Search here wwith topics
03	https://youtu.be/AFLuAKGhanw https://www.bing.com/ck/a	Search here with topics
04	https://www.youtube.com/watch?v=3ths577Wxpw	Search here with topics

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
26452	Civil CAD -II	T	P	C
		1	6	3

Rationale	<p>Drawing is the language of engineers. Engineering is absolutely incomplete without thorough knowledge of drawing. Civil Diploma Engineer must be capable of sketching detailed constructional drawing of various components of building for the purpose of communication with project related person or Engineer.</p> <p>CAD is Computer-Aided Design software. It allows users to create and edit 2D and 3D designs faster and more readily than hand. AutoCAD is a design tool which will be reduce the human efforts compared manual drafting. The data also be saved and kept in the cloud, making them accessible from anywhere at any time. CAD is a software application that is used to create drafting solutions. CAD is available in mobile, cloud-based, and web-based versions.</p> <p>Civil diploma Students must create drawing appropriately in their Civil Engineering projects, outlining every fact of the same. As a result, Civil Engineering students can utilize this CAD program to create simple and effective drawing for their Civil Engineering projects.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Describe the features of multi-storied building 2. Explain plan, section, elevation of framed structure multi-storied building with footing, Column, Grade beam, Floor beam and Slab. 3. State the plan, elevation and cross section of raft and pile foundation. 4. Explain RCC cantilever retaining wall. 5. Explain working drawing of beam, sun shed and slab 6. State the plan and sectional elevation of a half turn staircase, ramp and lift core 7. Describe 3d modeling and rendering using auto cad, Max and Maya.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Prepare a plan, layout plan, section and elevation for multi-storied framed structure building using CAD 2. Prepare a plumbing layout plan for a toilet with required fixture 3. Prepare kitchen layout plan showing sink and Gus's burner 4. Prepare electrical layout plan showing light, fan and power point 5. Draw spread and RCC footing 6. Draw raft and Mat foundation 7. Prepare pile and pile cap 8. Draw continuous rectangular beam and T-beam with reinforcement 9. Prepare plan and section of one -way and two-way slab using CAD 10. Draw a plan and sectional elevation of a half turn staircase using CAD 11. Create a plan and sectional elevation of ramp using CAD 12. Prepare a working drawing for sunshed with lintel showing reinforcement using CAD 13. Prepare a sectional elevation and cross section for retaining wall with showing detail reinforcement using CAD. 14. Draw a complete plumbing drawing using CAD. 15. Create simple 3D object in Auto CAD. 16. Create 3D surface by using 3D poly, edge surf, rule surf, tab surf & mesh 17. Edit 3D objects using CAD. 18. Prepare a working drawing for Pannel and flush door. 19. Prepare a working drawing for aluminum window

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	FEATURES OF MULTI-STORIED BUILDING 1.1 Define multi-storied building. 1.2 Mention the advantages and limitations of multi-storied building. 1.3 Describe the main features of a multi-storied building. 1.4 Explain Set Back Rules and Floor Area Ratio (FAR). 1.5 Describe the process of drawing a multi-storied building. 1.6 List multi-storied building drawing approval authorities.	1	2
2	PLAN, SECTION, ELEVATION OF FRAMED STRUCTURE MULTI-STORIED BUILDING WITH SPREAD, COLUMN FOOTING FOUNDATION USING AUTO CAD 2.1 Define framed structure building. 2.2 Describe the drawing procedure of site plan and layout plan of a framed structure building. 2.3 Describe the main consideration to prepare ideal plan of a building. 2.4 Describe the drawing procedure of floor plan, elevation and sectional elevation of a multi-storied framed structure building. 2.5 Describe the setting procedure of door and window in a floor plan of building. 2.6 Describe the drawing procedure of plumbing layout plan of a building showing different fittings and fixture. 2.7 Describe the drawing procedure of Electrical layout plan of a building showing different point and earthing. 2.8 Describe the drawing procedure of square and rectangular column and footing with showing reinforcement. 2.9 Describe the drawing process of spread footing foundation.	4	7
3	PLAN, ELEVATION AND CROSS SECTION OF RAFT, PILE FOUNDATION AND RCC CANTILEVER RETAINING WALL 3.1 Describe different types of foundation. 3.2 Describe the drawing process of isolated, combined, Mat and raft foundation with showing reinforcement. 3.3 State the drawing procedure of plan and sectional elevation of pre-cast pile with showing reinforcement. 3.4 State the drawing procedure of plan and sectional elevation of cast-in-situ pile with showing reinforcement. 3.5 Describe the drawing procedure of plan and sectional elevation of pile cap with showing reinforcement. 3.6 Describe the drawing procedure of detail elevation of R.C. C. retaining wall showing curtailment of reinforcement. 3.7 State the cross sectional drawing procedure of R.C.C. counterfort retaining wall. 3.8 Mention the drawing process of a R.C.C. counter fort retaining wall with showing reinforcement.	3	6

4	<p>WORKING DRAWING OF BEAM, SUNSHED AND SLAB</p> <p>4.1 Describe the drawing procedure of R.C.C. fully continuous rectangular beam with showing reinforcement.</p> <p>4.2 Describe the drawing procedure of column and beam joint with showing reinforcement.</p> <p>4.3 State the procedure of detailed drawing of RCC lintel with sunshade showing reinforcement</p> <p>4.4 Describe the drawing process of semi-continuous one- way slab with showing reinforcement.</p> <p>4.5 Describe the drawing process of fully continuous one- way slab with showing reinforcement.</p> <p>4.6 Describe the drawing process of semi-continuous two- way slab with showing reinforcement.</p> <p>4.7 State the drawing procedure of fully continuous two-way slab with showing reinforcement.</p>	2	4
5	<p>PLAN AND SECTIONAL ELEVATION OF A HALF TURN STAIRCASE, RAMP AND LIFT CORE</p> <p>5.1 Define stair and staircase.</p> <p>5.2 Define ramp.</p> <p>5.3 Mention the required slope of ramp for special abled person.</p> <p>5.4 State the condition to easy excess for special abled person in a staircase.</p> <p>5.5 Describe the drawing process of half turn staircase.</p> <p>5.6 Describe the drawing process of sectional elevation of a half turn staircase.</p> <p>5.7 Describe the drawing process of drawing of a half turn staircase with showing reinforcement.</p> <p>5.8 State the drawing procedure of ramp with showing reinforcement.</p> <p>5.9 State the drawing procedure of plan and section of lift core with showing the reinforcement.</p>	3	6
6	<p>3D MODELING AND RENDARING USING AUTO CAD.</p> <p>6.1 Explain starting 3D.</p> <p>6.2 Explain the procedure to create 3D model.</p> <p>6.3 Explain the creating procedure of surface modeling and rendering.</p> <p>6.4 Explain the uses of 3D editing commands.</p> <p>6.5 Explain creating procedure of perspective view.</p> <p>6.6 Describe the uses of distance and camera in perspective view.</p> <p>6.7 Describe the rendering and materials effect in 3D.</p> <p>6.8 Describe the uses & set up of background in 3D.</p> <p>6.9 Describe the lighting & shadow in 3D.</p> <p>6.10 Describe the uses of showing images in 3D.</p>	3	5
Total		16	30

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment Name with procedure	Class (3 Period)	Marks (Continuous)
1	<p>PREPARE A PLAN, LAYOUT PLAN, SECTION AND ELEVATION FOR MULTI-STORIED FRAMED STRUCTURE BUILDING USING CAD</p> <p>1.1 Draw a line diagram of a multistoried building with verandah, kitchen and toilet. 1.2 Draw Typical floor plan with verandah 1.3 Draw front and side elevation of a three storied building 1.4 Draw the cross section of building. 1.5 Set dimensions, heading and title block in proper places on one sheet according to given data. 1.6 Draw the isometric view of a building showing front and one side elevation. 1.7 Perform the presentation. 1.8 Maintain the record of performed job.</p>	2	4
2	<p>PREPARE A PLUMBING LAYOUT PLAN FOR A TOILET WITH REQUIRED FITTINGS AND FIXTURE</p> <p>2.1 Draw a toilet plan. 2.2 Set fittings and fixture as per scale 2.3 Draw elevation and section with dimension 2.4 Draw pipe layout plan 2.5 Set dimensions, heading and title block in proper places on one sheet according to given data. 2.6 Draw the isometric view of a toilet. 2.7 Perform the presentation. 2.8 Maintain the record of performed job.</p>	2	3
3	<p>PREPARE KITCHEN LAYOUT PLAN SHOWING SINK AND GUS BURNER</p> <p>3.1 Draw a kitchen plan. 3.2 Set fittings and fixture and kitchen accessories as per scale 3.3 Draw elevation and section with dimension 3.4 Draw pipe layout plan 3.5 Set dimensions, heading and title block in proper places on one sheet according to given data. 3.6 Draw the isometric view of a kitchen. 3.7 Perform the presentation. 3.8 Maintain the record of performed job.</p>	1	2
4	<p>PREPARE ELECTRICAL LAYOUT PLAN SHOWING LIGHT, FAN, POWER, EARTHING POINT</p> <p>4.1 Draw plan for a building with verandah, kitchen and toilet 4.2 Set light, Fan, power point and earthling 4.3 Set switch, calling bell and two pin point in required location. 4.4 Set Sub distribution board location. 4.5 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 4.6 Perform the presentation. 4.7 Maintain the record of performed job.</p>	2	3
5	<p>DRAW RCC FOOTING</p> <p>5.1 Draw Isolated, combined and continuous R.C.C footing for load bearing wall with the given data (showing of offsets & position of DPC). 5.2 Draw foundation layout plan 5.3 Draw RCC Column footing with Grade beam showing reinforcement 5.4 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 5.5 Perform the presentation. 5.6 Maintain the record of performed job.</p>	2	3

6	<p>CREATE RAFT AND MAT FOUNDATION</p> <p>6.1 Draw Raft and Mat foundation with column layout 6.2 Draw Sectional elevation showing reinforcement 6.3 Draw RCC Column footing with raft foundation 6.4 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 6.5 Perform the presentation. 6.6 Maintain the record of performed job.</p>	2	3
7	<p>PREPARE PILE AND PILE CAP</p> <p>7.1 Draw RCC cast-in-situ pile with reinforcement. 7.2 Draw RCC precast pile with reinforcement 7.3 Draw sections of a square pre-cast RCC pile. 7.4 Draw the cross-section of a pile cap over a group of piles. 7.5 Draw the shoe of a pile. 7.6 Perform the presentation. 7.7 Maintain the record of performed job.</p>	2	3
8	<p>DRAW CONTINUOUS RECTANGULAR BEAM AND T-BEAM WITH REINFORCEMENT</p> <p>8.1 Draw RCC Beam layout plan 8.2 Draw long and cross section of R.C.C T-Beam with reinforcement 8.3 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 8.4 Perform the presentation. 8.5 Maintain the record of performed job.</p>	2	3
9	<p>PREPARE PLAN AND SECTION OF ONE -WAY AND TWO-WAY SLAB USING CAD</p> <p>9.1 Draw RCC slab layout plan 9.2 Draw long and cross section of R.C.C One- and Two-way Slab with reinforcement. 9.3 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 9.4 Perform the presentation. 9.5 Maintain the record of performed job.</p>	2	3
10	<p>CREATE A PLAN AND SECTIONAL ELEVATION OF A HALF TURN STAIRCASE USING CAD</p> <p>10.1 Draw stair case layout plan 10.2 Locate landing, Trade and rise with standard measurement. 10.3 Draw sectional elevation with reinforcement 10.4 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 1.9 Perform the presentation. 1.10 Maintain the record of performed job.</p>	2	3
11	<p>CREATE A PLAN AND SECTIONAL ELEVATION OF RAMP USING CAD</p> <p>11.1 Draw Ramp with appropriate slope 11.2 Locate railing. 11.3 Draw sectional elevation with reinforcement. 11.4 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data. 11.5 Perform the presentation. 11.6 Maintain the record of performed job.</p>	1	3
12	<p>CREATE A WORKING DRAWING FOR SUNSHED WITH LINTEL SHOWING REINFORCEMENT USING CAD</p> <p>12.1 Draw Sun shed with lintel with standard dimension. 12.2 Draw sectional elevation with reinforcement.</p>	1	2

	<p>12.3 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data.</p> <p>1.11 Perform the presentation.</p> <p>1.12 Maintain the record of performed job.</p>		
13	<p>PREPARE A SECTIONAL ELEVATION AND CROSS SECTION FOR RETAINING WALL WITH SHOWING REINFORCEMENT USING CAD</p> <p>13.1 Draw a Retaining wall.</p> <p>13.2 Draw sectional elevation with reinforcement.</p> <p>13.3 Set symbol, dimensions, heading and title block in proper places on one sheet according to given data.</p> <p>1.13 Perform the presentation.</p> <p>1.14 Maintain the record of performed job.</p>	1	2
14	<p>CREATE A COMPLETE PLUMBING DRAWING USING CAD</p> <p>14.1 Draw a kitchen and toilet plan.</p> <p>14.2 Set fittings fixture and kitchen accessories as per scale.</p> <p>14.3 Draw elevation and section with dimension.</p> <p>14.4 Draw pipe layout plan with detail.</p> <p>14.5 Set dimensions, heading and title block in proper places on one sheet according to given data.</p> <p>14.6 Draw the isometric view of a given kitchen and toilet.</p> <p>1.15 Perform the presentation.</p> <p>1.16 Maintain the record of performed job.</p>	2	3
15	<p>CREATE SIMPLE 3D OBJECT IN AUTO CAD</p> <p>15.1 Draw a 3D object.</p> <p>15.2 View the object.</p> <p>15.3 View elevation with dimension.</p> <p>15.4 Print the object .</p> <p>1.17 Perform the presentation.</p> <p>1.18 Maintain the record of performed job.</p>	1	2
16	<p>CREATE 3D SURFACE BY USING 3D POLY, EDGE SURF, RULE SURF, TAB SURF & MESH</p> <p>16.1 Select 3D surface.</p> <p>16.2 View the surface.</p> <p>16.3 View elevation with dimension.</p> <p>16.4 View the surface with mesh.</p> <p>16.5 Print the object.</p> <p>1.19 Perform the presentation.</p> <p>1.20 Maintain the record of performed job.</p>	2	2
17	<p>EDIT THE 3D OBJECTS USING CAD</p> <p>17.1 Select 3D object.</p> <p>17.2 View the object.</p> <p>17.3 Edit the object.</p> <p>17.4 View elevation with dimension.</p> <p>17.5 Print the object.</p> <p>1.21 Perform the presentation.</p> <p>1.22 Maintain the record of performed job.</p>	2	2
18	<p>PREPARE A WORKING DRAWING FOR PANNEL AND FLUSH DOOR.</p> <p>18.1 Draw the elevation of a paneled door.</p> <p>18.2 Draw horizontal section of paneled door with section.</p> <p>18.3 Draw vertical section of paneled door with cross section.</p> <p>18.4 Draw the horizontal and vertical section of a fully glazed window.</p> <p>18.5 Print the object.</p> <p>18.6 Perform the presentation.</p> <p>18.7 Maintain the record of performed job.</p>	2	2
19	<p>PREPARE A WORKING DRAWING FOR ALUMINUM WINDOW</p> <p>19.1 Draw the elevation and section of a window with standard dimension.</p> <p>19.2 Draw sectional elevation.</p> <p>19.3 Draw the horizontal and vertical section of a fully glazed window</p> <p>19.4 Print the object .</p> <p>19.5 Perform the presentation.</p>	1	2

	19.6 Maintain the record of performed job.		
		Total	32
			50

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
01	Computer Monitor	20 No
02	CPU	20 No
03	Key Board	20 No
04	Mouse	20 No
05	Mouse Pad	20 No
06	Multimedia Projector	1 No
07	Projector Screen	1 No
08	Internet connection	1 No
09	Printer	1 No
10	Scanner	1 No
11	Auto Cad 2023 Software 2D and 3D	1 No
12	Dust Mask	10 Packet
13	Flower broom	2 dozoon
14	Air Condition (Two Ton Capacity)	2 nos
15	Sound System	2 nos

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01.	Civil Engineering Drawing	Guru Charan Singh	Standard Publications First Edition,2009
02.	Engineering Drawing	R.B. Gupta	SatyaPrakashan, 1 January 2018
03.	Structural Detailing	Peter H Newton	Palgrave, 10 Jun 1991
04	AutoCAD	Engr. Md. Shah Alam	Gancosh Procasoni Ever green eddition
05	Mastering AutoCAD	Engr. Samuel Mallik	Systech Publication Ltd
06	Mastering AutoCAD	George Omura	Sybex Inc.U.S

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	Link https://youtu.be/tNATCAHSgzY	Search here with topics
02	Link https://youtu.be/S99bWdvOd4o	Search here with topics
03	Link https://youtu.be/9d9oRoZXxJk	Search here with topics
04	https://youtu.be/zx8SOiJv3Rc	Search here with topics
05	https://youtu.be/5sMoIWT5FgU	Search here with topics
06	https://youtu.be/yOGzf_Myxmc	Search here with topics

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
		T	P	
26453	Surveying-III	2	3	3

Rationale	<p>Civil Engineering diploma graduate in Civil Engineering are supposed to effectively to know about different type of survey works. Survey is a gathering information of the earth surface in details accurate and output of data for planning the design and mapping work.</p> <p>An Engineer should be knowing the terrain condition of the earth surface by using any modern survey technology. To perform above task, it is essential that student should have basic knowledge about various type of surveying. Such as Curve ranging, Setting out Plan/alignment, Hydrographic survey, Total station, City survey. Therefore, the subject of surveying is very important for Civil Engineering diploma graduate.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. State circular curve for road and railway or canal. 2. Interpret vertical curve for road. 3. Describe the transition curve for different road. 4. Explain layout of building & road alignment. 5. Describe different component/parts of a total station and its use. 6. Describe the sounding and can draw canal or river section. 7. Explain Plot topography & contour map of an area.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Set out circular curve by offset from long chord method. 2. Set out circular curve by offset from tangent (radial method). 3. Set out circular curve by offset from tangent (perpendicular method). 4. Set out circular curve by one theodolite method (Rankin method). 5. Set out circular curve by two theodolite method. 6. Perform layout plan of a building using theodolite. 7. Perform river or canal cross section by sounding method. 8. Perform Total Station. 9. Determine the horizontal and vertical distances with total station. 10. Conduct traversing with a total station and plot map including computation of area.

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	Curve and curve ranging 1.1 State the concept of curve and curve ranging. 1.2 Classify curve. 1.3 Describe circular curve with nomenclature. 1.4 Deduce the formula to find radius of a circular curve. 1.5 Deduce the formula to calculate different elements of simple curve. 1.6 Mention the different methods of curve ranging. 1.7 Describe the procedure to find out deflection angle. 1.8 Explain the importance of peg interval. 1.9 Solve the problem on different elements of simple curve.	4	6
2	Setting out curves by linear methods 2.1 Deduce setting out curve by linear method. 2.2 Deduce the formula for setting out curve by ordinates from long chord. 2.3 Mention the procedure of setting out curve by ordinates from long chord. 2.4 Deduce the formula for setting out curve by offsets from tangent using radial method. 2.5 Express the deduction of formula for setting out curve by offsets from tangent using perpendicular method. 2.6 Solve the problems on setting out of circular curves.	3	6
3	Setting out curves by angular methods 3.1 Describe the angular methods of curve ranging. 3.2 Deduce the formula for setting out curve by one theodolite method. 3.3 Describe the procedure of setting out curve by one theodolite method. 3.4 Describe the procedure of setting out curve by two-theodolite method. 3.5 Solve the problems on setting out curve by angular method.	3	6
4	Transition curve 4.1 Describe transition curve. 4.2 List the elements of transition curve. 4.3 Mention the conditions of transition curve. 4.4 Mention different types of transition curve. 4.5 Deduce the formula to calculate super elevation. 4.6 Deduce the formula to calculate the length of transition curve as used in highways and railways.	4	6

	<p>4.7 Describe the necessity of shifting curve.</p> <p>4.8 Describe the procedure of setting out transition curve by tangential angle method.</p> <p>4.9 Solve the problems on transition curves.</p>		
5	<p>Vertical curve</p> <p>5.1 Describe vertical curve.</p> <p>5.2 Mention different types of vertical curve with purposes.</p> <p>5.3 Explain the properties of parabola.</p> <p>5.4 Describe the calculating process of setting out data for vertical curve.</p> <p>5.5 Describe the procedure to find out the grade of an undulated proposed road.</p> <p>5.6 Describe the procedure of setting out vertical curves.</p> <p>5.7 Solve the problem on vertical curve.</p>	3	6
6	<p>Setting out plan of a building and alignment of a road</p> <p>6.1 State the meaning of lay-out plane of a building.</p> <p>6.2 Explain the significance of setting out a plan of a building and alignment of a road.</p> <p>6.3 List the instrument and accessories required for setting out works for building and road alignment.</p> <p>6.4 Describe the procedure of providing reduce levels on different parts of a building and road.</p>	3	6
7	<p>Sounding</p> <p>7.1 Define sounding.</p> <p>7.2 Describe the duties of member to take sounding.</p> <p>7.3 Distinguish between shoreline and range line.</p> <p>7.4 Describe various types sounding equipment.</p> <p>7.5 Describe the procedure of measuring sounding.</p> <p>7.6 Mention the methods of locating sounding.</p> <p>7.7 Explain the reduction of sounding.</p> <p>7.8 Solve the problems on reduction of sounding.</p> <p>7.9 Describe the process of plotting of sounding.</p> <p>7.10 Describe three points problem.</p>	3	6
8	<p>Operation and uses of total station</p> <p>8.1 Describe the components of total station.</p> <p>8.2 Mention the uses of total station.</p> <p>8.3 Describe the procedural steps of setting total station.</p> <p>8.4 Name the fundamental lines of total station.</p> <p>8.5 Mention the relation among the fundamental lines.</p> <p>8.6 List different types of adjustment.</p>	3	6
9	<p>Principles of making traverse with total station</p> <p>9.1 List the fieldworks involved in survey with total station.</p>	3	6

	<p>9.2 Describe the procedure of measuring horizontal distance with total station.</p> <p>9.3 Describe the procedure of measuring horizon vertical height with total station.</p> <p>9.4 Describe the operational steps of traverse survey with total station.</p> <p>9.5 Compute the Gale's traverse with the help of total station.</p> <p>9.6 Describe the plotting of map of a traverse survey with total station.</p>		
10	<p>City survey</p> <p>10.1 Define city survey.</p> <p>10.2 Explain the purposes of city survey.</p> <p>10.3 List the maps required for city survey.</p> <p>10.4 Describe the methods to establish horizontal and vertical control.</p> <p>10.5 List the instrument required for city survey.</p> <p>10.6 Describe the method to prepare topographic map of a city.</p> <p>10.7 Explain the objects of the property survey of a city.</p> <p>10.8 Describe the method to prepare property map of a city.</p> <p>10.9 Describe the method to prepare wall map of a city.</p> <p>10.10 Describe the method to prepare underground map of a city.</p>	3	6
	Total	32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Set out circular curve by offset from long chord method</p> <p>1.1 Select the required tools and equipment.</p> <p>1.2 Select mid-point of long chord & set perpendicular line using measuring tape.</p> <p>1.3 Calculate the offset value using long chord method.</p> <p>1.4 Set out the Circular curve using above data.</p> <p>1.5 Maintain the record of performed job.</p>	1	2
2	<p>Set out circular curve by offset from tangent using radial method</p> <p>2.1 Select the required tools and raw materials.</p> <p>2.3 Select the tangent line.</p> <p>2.3 Select the 1st tangent point & set perpendicular line up to center of curve using Measuring tape.</p> <p>2.4 Calculate the offset value using this method.</p> <p>2.5 Set line from tangent line to center point and cut offset</p>	1	2

	<p>distance from tangent line.</p> <p>2.6 Set out the Circular curve using above data.</p> <p>2.6 Maintain the record of performed job.</p>		
3	<p>Set out circular curve by offset from tangent using perpendicular method</p> <p>3.1 Select the required tools and raw materials.</p> <p>3.2 Select a tangent line up to point of intersection.</p> <p>3.4 Calculate the offset value using this method.</p> <p>3.4 Set perpendicular line at center intervals and cut the offset length.</p> <p>3.5 Connect 1st tangent point and end of offset line.</p> <p>3.6 Set out the Circular curve using above data.</p> <p>3.7 Maintain the record of performed job.</p>	1	2
4	<p>Set out circular curve by one theodolite method using Rankin method</p> <p>4.1 Collect the required tools and raw materials.</p> <p>4.2 Select tangent line & set theodolite of 1st tangent point.</p> <p>4.3 Set angular value for each point & sub-chord distance intersection point is marked.</p> <p>4.4 Maintain the record of performed job.</p>	1	2
5	<p>Set out circular curve by two theodolite method</p> <p>5.1 Collect the required tools and raw materials.</p> <p>5.2 Select long chord & set two theodolites at the end of line.</p> <p>5.3 Set the angular line through 1st tangent point.</p> <p>5.4 Set the angular values to each theodolite for 1st theodolite with point intersection & 2nd theodolite with 1st tangent point.</p> <p>5.5 Maintain the record of performed job.</p>	1	2
6	<p>Perform layout plan of a building using measuring tap and theodolite.</p> <p>6.1 Collect the required tools and raw materials.</p> <p>6.2 Select any corner point of intersection of grid lines.</p> <p>6.3 Check the setback distance from properties line.</p> <p>6.4 Set zero with setback position & set 90° to find out perpendicular line as grid line.</p> <p>6.5 Using measuring tap or theodolite.</p> <p>6.6 Maintain the record of performed job.</p>	2	3
7	<p>Perform river or canal cross section by sounding method</p> <p>7.1 Collect the required tools and raw materials.</p> <p>7.2 Select & tie a rope through a rime line of canal.</p> <p>7.3 Set a tied gauge at visible location of the canal / river.</p>	1	3

	<p>7.4 Select/Mark sound points at certain interval on the rope.</p> <p>7.5 Take sounding and tied gauge reading for each point at the same time.</p> <p>7.9 Maintain the record of performed job.</p>		
8	<p>Perform Total Station</p> <p>8.1 Collect the required tools and raw materials.</p> <p>8.2 Set a total station.</p> <p>8.3 Make temporary adjustment.</p> <p>8.4 Demonstrate instrument.</p> <p>8.5 Use Total station.</p> <p>8.6 Maintain the record of performed job.</p>	2	3
9	<p>Determine the horizontal and vertical distances with total station</p> <p>9.1 Collect the required tools and raw materials.</p> <p>9.2 Set total station on a certain point & complete temporary Adjustment.</p> <p>9.3 Go to the "Meas" mode and press "Dist." for horizontal distance. Also press "SHV" for other distance (slope, Horizontal & vertical distance).</p> <p>9.4 Maintain the record of performed job.</p>	2	2
10	<p>Conduct traversing with a total station and plot map including computation of area.</p> <p>10.2 Collect required tools and raw materials.</p> <p>10.3 Select certain area and perform reconnaissance survey.</p> <p>10.3 Choose & mark the instrument station points.</p> <p>10.4 Set to total station on any of the station points, after temporary adjustment input the station & back sight co-ordinates data.</p> <p>10.5 Perform the orientation of data points inputted.</p> <p>10.6 Taka the boundary line point data using prism or non-prism mode.</p> <p>10.7 Draw topography map/ contour map using survey software & Auto CAD.</p> <p>10.8 Compute area from Meas>Menu> Area Mode & SL No (11.5) data</p> <p>10.9 Maintain the record of performed job.</p>	2	2
11	<p>Perform Field visit</p> <p>11.1 Select field</p> <p>11.2 Observe the field</p>	2	2

	11.3 Collect data 11.4 Prepare and present report 11.5 Maintain the record of performed task.		
	Total	16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity (Per Group)
1	LIST OF HAND TOOLS: Chain, Measuring Tap, ranging rod, Arrow, Peg, Tied, Gauge, Compass. Sounding pole, Led line,	01
2	LIST OF POWER TOOLS: Survey software & Auto CAD.	01
3	LIST OF EQUIPMENT: Theodolite / Digital Theodolite, Total station, GPS Mounted Echo Sounder.	01

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Surveying and leveling	T P kanetkar	Laxmi Publishers, 5 th 2004
02	Surveying	Norman Thomas	Dhanpat Rai Publishers
03	Surveying Vol-2	B C Punmia, Ashok Kr. Jain, Arun Kr Jain	L P Publishers.

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	www.laxmipublications.com	Search here with topics
02	www.ishkapur@vsnl.com	Search here with topics
03	www.kopykitab.com	Search here with topics

SUBJECT CODE	SUBJECT NAME	PERIOD/WEEK		CREDIT
		T	P	C
26454	Theory of Structure	2	3	3

Rationale	The theory of structure syllabus in a diploma engineering course covers fundamental concepts related to the behavior and analysis of structures under different types of forces. The rationale behind including topics such as shear forces and bending moments, shear stresses; bending stresses and deflection of beams, joint and connections, stability dams and retaining walls; buckling of columns is to provide students with a comprehensive understanding of how various structures respond to different types of loads and forces.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Define shear force and bending moment of beams. 2. State the Theory of the bending stresses in beams. 3. Explain shearing stresses in beams. 4. Explain the Deflection of beams. 5. State the Concept of steel structure and joints. 6. Explain Significance of welded connections. 7. State action of forces in steel frames. 8. State the stability of masonry dam. 9. State the stability of Retaining Walls. 10. Explain elastic buckling of columns.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Compare theoretical and practical value of shear force and bending moment for simply supported beam. 2. Compare theoretical and practical value of shear force and bending moment for Overhanging beam. 3. Determine the position of dangerous section and inflection point. 4. Draw the bending stresses diagram of circular, rectangular & hollow sections of beams. 5. Draw the bending stresses diagram of I, T, L sections of beams. 6. Draw the shearing stresses diagram of circular and rectangular sections of beam. 7. Draw the shearing stresses diagram of I & T sections of beam. 8. Determine the section of homogeneous beam with respect to shearing stress and bending stress. 9. Compare theoretical and practical value of deflection for cantilever and simply supported beam. 10. Draw the neat sketches of different type of riveted joints showing the mode of failures. 11. Determine the forces developed on the member of a truss graphically. 12. Prepare models of different types of trusses.

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1Period)	Final Marks
1.	Shear force and bending moment of beams 1.1 Define determinate, indeterminate and homogeneous structure. 1.2 Mention different types of support condition. 1.3 Relate between shear force and bending moment. 1.4 Define dangerous section and point of contra flexure. 1.5 Solve the problems on SF and BM of cantilever beam with concentrated load, distributed load, inclined load and combined loads. 1.6 Solve the problems on SF and BM of simply supported beam with concentrated load, distributed load, inclined load and combined loads. 1.7 Solve the problems on SF and BM of overhanging beam with concentrated load, distributed load, inclined load and combined loads.	6	9
2	Bending and Shear stresses in beams 2.1 State the meaning of bending and shearing stresses in beam. 2.2 List the assumptions of bending stresses in beam. 2.3 Differentiate between bending moment and bending stress. 2.4 Derive the formula for bending and shearing stress. 2.5 Differentiate between maximum and average shear stress. 2.6 State the meaning of elastic section modulus. 2.7 Relate maximum shear stress and average shear stress for rectangular, circular and triangular section. 2.8 Solve the problems on section modulus of circular, rectangular, I, T, L and hollow sections of beams. 2.7 Solve the problems on bending and shearing stresses of circular, rectangular, I, T, L and hollow sections of beams. 2.8 Determine the section of homogeneous beam with respect to shearing stress and bending stress.	6	12
3	Deflection of beams 3.1 State the meaning of deflection of beam and elastic curve. 3.2 List the assumptions of deflection of beam. 3.3 State the maximum allowable deflection for RCC beam, RCC slab and steel beam. 3.4 Derive the equation for elastic curve. 3.5 State the 1st and 2nd area moment theorem. 3.6 Compute the slope of elastic curve for cantilever beam with concentrated and distributed load. 3.7 Compute the maximum deflection for cantilever beam	4	6

	<p>with concentrated and distributed load.</p> <p>3.8 Compute the slope of elastic curve for simply supported beam with symmetrically concentrated and distributed load.</p> <p>3.9 Compute the maximum deflection for simply supported beam with symmetrically concentrated and distributed load.</p>		
4	<p>Joints in steel structure</p> <p>4.1 Define steel structure.</p> <p>4.2 Describe joint and connections of steel structure.</p> <p>4.3 Differentiate between cold rolled and built up section.</p> <p>4.4 Name the elements of pre-fabricated building.</p> <p>4.5 Define pitch, back pitch and repeating section.</p> <p>4.6 State the necessity of joints.</p> <p>4.7 Classify joints.</p> <p>4.8 State the efficiency of joints.</p> <p>4.10 Explain the modes of failure and remedial measures of riveted joints.</p> <p>4.11 Solve the problems on simple lap joint and butt joint Subjected to axial load only.</p>	2	6
5	<p>Welded connections</p> <p>5.1 Define Fillet, Leg and Throat.</p> <p>5.2 State the significance of welded connections.</p> <p>5.3 Classify welded connections.</p> <p>5.4 Mention the merits and demerits of welded connections.</p> <p>5.5 Solve the problems on fillet weld connection subjected to axial load only.</p> <p>5.6 Solve the problems on butt weld connection subjected to axial load only.</p>	2	5
6	<p>Forces in steel frames</p> <p>6.1 Define truss, tie, strut, redundant, deficient, web and Chord member, perfect and imperfect frame.</p> <p>6.2 Mention different types of roof trusses, bridge trusses and beams.</p> <p>6.3 State the fundamental assumptions in trusses.</p> <p>6.4 Describe the methods of computing forces in trusses.</p> <p>6.5 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by Analytical (joint and moment) method.</p> <p>6.6 Determine the forces on frames for warren truss, cantilever and Howe truss with dead load by graphical method.</p>	3	7
7	<p>Masonry dam</p> <p>7.1 Define dam.</p> <p>7.2 Mention the functions of a dam.</p> <p>7.3 Mention the different types of dams.</p> <p>7.4 Explain the stability of a masonry dam.</p> <p>7.5 State the meaning of middle third law.</p>	3	4

	<p>7.6 Derive the equation for minimum width of the base for Just no tension.</p> <p>7.7 Calculate the maximum and minimum pressure on the Foundation bed for rectangular dam.</p> <p>7.8 Calculate the maximum and minimum pressure on the foundation bed for trapezoidal dam having water face Vertical only.</p> <p>7.9 Solve the problems on stability of the dam.</p>		
8	<p>Retaining Walls</p> <p>8.1 Define the Retaining Wall.</p> <p>8.2 Mention the types of Retaining Walls.</p> <p>8.3 Explain the stability of Retaining Walls.</p> <p>8.4 Solve the problems on stability of the Cantilever Retaining Walls.</p>	3	4
9	<p>Elastic buckling of columns</p> <p>9.1 State the meaning of short and long column.</p> <p>9.2 Mention the type of columns on the basis of end Conditions.</p> <p>9.3 Compare the equivalent length of different columns.</p> <p>9.4 Interpret the Euler's formula for flexural buckling of a pin ended strut/column.</p> <p>9.5 Calculate the safe load on column using Euler's formula.</p> <p>9.6 State the Rankin-Gordon formula.</p> <p>9.7 Calculate the safe load on column using Rankin-Gordon formula.</p>	3	7
	Total	32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Determine shear force & bending moment at different sections of simply supported beam with concentrated loads and draw the diagrams.</p> <p>1.1 Collect the shear force and bending moment apparatus.</p> <p>1.2 Collect Calculator, Paper, Pencil, Eraser, Clip Board.</p> <p>1.3 Calculate the theoretical value of shear force and bending moment.</p> <p>1.4 Apply concentrated load on shear force and bending moment apparatus.</p> <p>1.5 Measure the value of shear force and bending moment through the shear force and bending moment apparatus.</p> <p>1.6 Compare the measured value with theoretical value.</p> <p>1.7 Maintain the record of performed job.</p>	2	2
2	<p>Determine shear force & bending moment at different sections of overhanging beam with concentrated loads and draw the diagrams.</p> <p>2.1 Collect the shear force and bending moment apparatus.</p> <p>2.2 Collect Calculator, Paper, Pencil, Eraser, Clip Board.</p>	2	2

	<p>2.3 Calculate the theoretical value of shear force and bending moment.</p> <p>2.4 Apply concentrated load on shear force and bending moment apparatus.</p> <p>2.5 Measure the value of shear force and bending moment through the shear force and bending moment apparatus.</p> <p>2.6 Compare the measured value with theoretical value.</p> <p>2.7 Maintain the record of performed job.</p>		
3	<p>Determine the position of dangerous section and inflection point or point of contra flexure of overhanging beam and show in diagram.</p> <p>3.1 Collect the shear force and bending moment apparatus.</p> <p>3.2 Collect Calculator, Paper, Pencil, Eraser, Clip Board.</p> <p>3.3 Calculate the theoretical value of shear force and bending moment.</p> <p>3.4 Draw shear force and bending moment diagram .</p> <p>3.5 Identify dangerous section and inflection point into the diagram.</p> <p>3.6 Maintain the record of performed job.</p>	1	2
4	<p>Determine the bending stresses of circular, rectangular & hollow sections of beams and draw the diagrams.</p> <p>4.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc.</p> <p>4.2 Calculate bending Stress value for different depth of section.</p> <p>4.3 Draw bending stress diagram of the section.</p> <p>4.4 Maintain the record of performed job.</p>	1	2
5	<p>Determine the bending stresses of I, T, L sections of beams and draw the diagrams.</p> <p>5.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc.</p> <p>5.2 Calculate bending Stress value for different depth of section.</p> <p>5.3 Draw bending stress diagram of the section.</p> <p>5.4 Maintain the record of performed job.</p>	1	2
6	<p>Determine the shearing stresses of circular and rectangular sections of beams and draw the diagrams.</p> <p>6.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc.</p> <p>6.2 Calculate shearing stress value for different depth of section.</p> <p>6.3 Draw bending stress diagram of the section.</p> <p>6.4 Maintain the record of performed job.</p>	1	2
7	<p>Determine the shearing stresses of I & T sections of beams and draw the diagrams.</p> <p>7.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc.</p> <p>7.2 Calculate shearing stress value for different depth of section.</p> <p>7.3 Draw bending stress diagram of the section.</p> <p>7.4 Maintain the record of performed job.</p>	1	2
8	<p>Determine the section of homogeneous beam with respect to shearing stress and bending stress.</p> <p>8.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc.</p> <p>8.2 Find out the cross section of a homogeneous rectangular</p>	1	2

	beam with respect to shearing stress and bending stress.		
9	Determine the deflection of cantilever and simply supported beam with respect to concentrated load. 9.1 Collect the deflection of beam apparatus. 9.2 Collect Calculator, Paper, Pencil, Eraser, Clip Board. 9.3 Calculate the theoretical value of deflection. 9.4 Apply concentrated load on deflection of beam apparatus. 9.5 Measure the amount of deflection through the deflection of beam apparatus. 9.6 Compare the measured value to theoretical value.	1	2
10	Draw the neat sketches of different type of riveted joints showing the mode of failures. 10.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc. 10.2 Draw the sketch of riveted joints failure mode. 10.3 Maintain the record of performed job.	1	1
11	Determine the forces developed on the member of a truss graphically. 11.1 Collect Calculator, Paper, Pencil, Eraser, Clip Board etc. 11.2 Draw a sketch of a truss showing applied load. 11.3 Calculation of member forces. 11.4 Graphically Presentation of calculated member forces.	1	2
12	Prepare some models of different types of trusses with suitable materials. 12.1 Collect required tools and suitable raw materials. 12.2 Preparation a model of King post truss using suitable materials. 12.3 Preparation a model of Queen post truss. 12.4 Preparation a model of Steel truss.	2	2
13	Field visit to related steel structure of an industry building.	1	2
	Total	16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
1	LIST OF HAND TOOLS:	00
2	LIST OF POWER TOOLS:	00
3	LIST OF EQUIPMENT: Share force & Bending Moment Apparatus, Deflection of beam apparatus	02

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Theory of Simple structure	T C Shed and J Vawter	John Wiley and Sons
02	Strength of materials and structures	J Case and A H Chilver	Edward Arnold (Publishers)Ltd.
03	Theory of structures	R S Khurmi	Publisher: S. Chand
04	Strength of Materials	R S Khurmi	S. Chand & Company Ltd.

05	Steel Structure	GayLord	New Yark: McGraw - Hill
----	-----------------	---------	-------------------------

WEBSITE REFERENCES:

Sl	Web Link	Remarks
01	www.laxmipublications.com	Search here with topics
02	www.ishkapur@vsnl.com	Search here with topics
03	www.kopykitab.com	Search here with topics

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
		T	P	
26455	Water Supply Engineering	2	3	3

Rationale	<p>Civil engineering is directly related to daily life of people. Construction of any structure is not possible without civil engineering and hence dwelling place is also. Without water nothing can survive in this world, it may be organism as well as human being. For that Purpose, water supply engineering plays a vital role in human life.</p> <p>After completing this course student will be able to acquire knowledge and skill about water sources, quality, quantity, purification and distribution of water in house, industry, rural and urban area etc.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Describe different Sources of water. 2. Explain Water requirements. 3. State application of water pipes & fittings. 4. Interpret different types of collection and transmission of water. 5. Describe quality of water. 6. Explain different types of water Treatment. 7. Describe water distribution system in Bangladesh. 8. Explain Rural and Urban water supply system in Bangladesh. 9. State Water reservoir. 10. Describe Plumbing system.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Identify pipes and fittings. 2. Perform thread cuttings. 3. Observe water purification plant and deep tube well. 4. Test temperature, pH and total dissolved solids (TDS) of water sample. 5. Measure color, odor and turbidity of water sample. 6. Determine arsenic of water. 7. Measure total suspended solids (TSS) of water sample. 8. Measure hardness of water sample. 9. Identify different Components of no.6 hand pump

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	<p>WATER SUPPLY ENGINEERING AND THE SOURCES OF WATER</p> <p>1.1 Define water supply engineering. 1.2 Describe the importance and necessity of planned water supply. 1.3 Explain the components of water supply system in Rural and Urban area. 1.4 Describe the impact of water supply on public health and environment. 1.5 Describe different sources of water. 1.6 Explain hydrological cycle. 1.7 State the advantages and disadvantages of ground water & Surface water. 1.8 Explain rainwater harvesting.</p>	2	6
2	<p>CONSUMPTION OF WATER</p> <p>2.1 Describe various methods to predict the future population. 2.2 Describe the necessity of clean water. 2.3 List the influence factors of per capita consumption of water. 2.4 Explain influencing factors of per capita consumption of water. 2.5 Explain the demand of water for firefighting and fire hydrant.</p>	2	6
3	<p>PIPES & PIPE JOINTS USED IN WATER SUPPLY SYSTEM</p> <p>3.1 Explain the different type of pipes according to size, materials, quality, and allowable stresses used in Bangladesh. 3.2 Describe the causes of corrosion of metal pipes. 3.3 State the methods of prevention and protection against corrosion. 3.4 Describe the uses of uPVC, PPR pipe and CPVC pipe in modern Building. 3.5 Explain the causes of deterioration in non-metal pipes. 3.6 Describe different joints used in pipes with sketches. 3.7 Describe the fittings and valves used in pipes with sketches. 3.8 State the methods of prevention and protection against corrosion. 3.9 Describe the uses of UPVC pipe in modern Building.</p>	3	6
4	<p>COLLECTION AND TRANSMISSION SYSTEM OF WATER</p> <p>4.1 Mention the different types of intake used in collecting surface water. 4.2 Describe the different intake systems with sketches. 4.3 Classify pump used in water supply. 4.4 Explain the uses and limitations of different type of pump. 4.5 Distinguish between turbine pump and submersible pump used in deep tube well.</p>	3	6
5	<p>SAFE WATER AND IMPURITIES IN WATER</p> <p>5.1 Define safe water and impurities water. 5.2 Describe the contamination of water due to cross connection and plumbing defects, storage and back siphonage. 5.3 State the different type of impurities present in water. 5.4 Explain the causes of turbidity, color, taste and odor in water.</p>	3	6

	<p>5.5 Mention the effects and maximum allowable limits (WHO & BSTI) of impurities in water.</p> <p>5.6 Explain the causes and effects of alkalinity, acidity and hardness in water.</p> <p>5.7 Describe the effects of gaseous impurities in water.</p> <p>5.8 Mention the causes and effects of nitrate and lead poisoning in water.</p>		
6	<p>TREATMENT OF WATER BY CLARIFICATION AND FILTRATION</p> <p>6.1 Explain a process flow diagram of treatment plant units.</p> <p>6.2 Outline the necessity of screening of water.</p> <p>6.3 Mention the principle of plain sedimentation.</p> <p>6.4 Mention the principle of sedimentation with coagulation.</p> <p>6.5 State different types of coagulants with purposes and action.</p> <p>6.6 Describe the process of flocculation.</p> <p>6.7 Describe a typical sketch of sedimentation tank.</p> <p>6.8 Explain the necessity of water filtration.</p>	4	6
7	<p>TREATMENT OF WATER BY FILTRATION, DISINFECTION AND SOFTENING</p> <p>7.1 State the theory of filtration of water for bacteriological removal.</p> <p>7.2 Explain the characteristics of slow sand filter and rapid sand filter.</p> <p>7.3 Describe the operation difficulties of slow sand and rapid sand filters.</p> <p>7.4 Describe disinfection of water by chlorination.</p> <p>7.5 Explain the advantages and limitations of disinfected water by chlorination.</p> <p>7.6 Compare among pre-chlorination, post chlorination, double chlorination and super chlorination.</p> <p>7.7 Explain the advantages of break point chlorination.</p> <p>7.8 Distinguish between hard and soft water.</p> <p>7.9 List different processes of water softening.</p> <p>7.10 Describe Heating and boiling, pH control, using oxidizing agent, Ultra-violet Ray and Ozone methods of disinfected water.</p>	4	6
8	<p>PROCESSES OF REMOVING COLOR, ODOR, TASTE, ARSENIC, IRON, MANGANESE AND SALINITY</p> <p>8.1 Explain the purposes of aeration.</p> <p>8.2 Describe the different methods of aeration.</p> <p>8.3 Describe the process of removal of color, odor and taste by activated carbon.</p> <p>8.4 Explain different methods of removing arsenic, iron and manganese with flow diagram.</p> <p>8.5 List different methods of desalination of water.</p>	2	4
9	<p>WATER DISTRIBUTION METHODS, CONSTRUCTION AND MAINTENANCE</p> <p>9.1 State the different features of the distribution systems.</p> <p>9.2 Describe different methods of supply of water with sketches.</p> <p>9.3 Outline the advantages and disadvantages of different methods of water supply.</p> <p>9.4 Describe different layout methods of distribution pipes with sketch.</p> <p>9.5 Explain advantages and disadvantages of different layout methods of distribution pipes.</p> <p>9.6 State the different types of Meters, Valves, Fire hydrant and Pipe &</p>	3	5

	<p>Fittings.</p> <p>9.7 Describe the procedure for handling and placing of pipes and their maintenance.</p> <p>9.8 Describe the procedure for placing and maintenance of hydrants and valves.</p> <p>9.9 Describe the procedure for cleaning of water mains and use of washout system.</p>		
10	<p>RESERVOIRS AND RURAL WATER SUPPLY SYSTEM IN BANGLADESH</p> <p>10.1 Mention different types of reservoirs according to position and shape.</p> <p>10.2 Explain the needs of roof tank and typical water reservoir in a building.</p> <p>10.3 Describe the typical section of roof tank and water reservoir in a building.</p> <p>10.4 State No. 6 hand pump and deep-set (Tara) pump.</p> <p>10.5 Describe the procedure of drilling, aquifer selection, back filling and installation techniques including developing of new tube well.</p> <p>10.6 Explain the design procedure of tube well strainer.</p> <p>10.7 Describe operation & maintenance of No. 6 hand pumps and deep-set (Tara) hand Pumps.</p> <p>10.8 Explain the drilling problems in rocky areas.</p> <p>10.9 Mention the alternative technologies name in problem areas of Bangladesh.</p> <p>10.10 Describe Shallow Shrouded Tube well (SST), Very Shallow Shrouded Tube well (VSST), Pond Sand Filter (PSF), Infiltration Galleries (IG), Iron Removal Unit (IRU) and Deep-set technologies.</p>	4	4
11	<p>PLUMBING SYSTEM</p> <p>11.1 Define plumbing system.</p> <p>11.2 List the requirements of plumbing installation.</p> <p>11.3 Mention the various plumbing fittings, fixtures and accessories.</p> <p>11.4 Describe the uses of various plumbing fittings and fixtures.</p> <p>11.5 Differentiate between plumbing fittings and fixtures.</p> <p>11.6 List the tools required for plumbing works.</p> <p>11.7 Mention the uses and maintenance of various plumbing tools.</p>	2	5
	Total	32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>IDENTIFY DIFERENT TYPES OF PIPES AND FITTINGS.</p> <p>1.1 Collect pipe and fittings.</p> <p>1.2 Identify G.I, PVC, UPVC, CPVC, PVR.</p> <p>1.3 Identify fitting items seen in the workshop.</p> <p>1.4 Sketch typical plumbing pipe and fittings.</p> <p>1.5 Maintain the record of performed job.</p>	1	2
2	<p>PERFORM THREAD CUTTINGS</p> <p>2.1 Collect the required tools and raw materials.</p> <p>2.2 Cut pipes with required length.</p>	2	2

	<p>2.3 Choose a proper diameter of the bar for cutting threads.</p> <p>2.4 Perform Clamping the pipe firmly with vice.</p> <p>2.5 Make thread as require (Inner side & Outer side).</p> <p>2.6 Maintain the record of performed job.</p>		
3	<p>DEMONSTRATION OF WATER PURIFICATION PLANT AND DEEP TUBE WELL</p> <p>3.1 Draw flow diagram of water purification processes after visiting a plant.</p> <p>3.2 Draw a section through a deep tube well & Identify Different elements of a deep tube well.</p> <p>3.3 Maintain the record of performed job.</p>	1	2
4	<p>DETERMINE TEMPERATURE, PH AND TOTAL DISSOLVED SOLIDS (TDS) OF WATER SAMPLE</p> <p>4.1 Collect water sample.</p> <p>4.2 Preserve water sample.</p> <p>4.3 Calibrate instrument.</p> <p>4.4 Take water into a beaker.</p> <p>4.5 Insert bulb/electrode into the beaker.</p> <p>4.6 Wait sometimes until the reading remain constant.</p> <p>4.7 Take reading.</p> <p>4.8 Maintain the record of performed job.</p>	1	2
5	<p>DETERMINE COLOR, ODOR AND TURBIDITY OF WATER SAMPLE</p> <p>5.1 Collect water sample.</p> <p>5.2 Preserve water sample.</p> <p>5.3 Take water into a beaker.</p> <p>5.4 Set the apparatus.</p> <p>5.5 Add reagents.</p> <p>5.6 Take reading.</p> <p>5.7 Maintain the record of performed job.</p>	2	2
6	<p>MEASURE ARSENIC IN WATER SAMPLE.</p> <p>6.1 Collect water sample.</p> <p>6.2 Preserve water sample.</p> <p>6.3 Take water into a beaker.</p> <p>6.4 Set the apparatus.</p> <p>6.5 Add reagents.</p> <p>6.6 Take reading.</p> <p>3.7 Maintain the record of performed job.</p>	1	2
7	<p>MEASURE THE HARDNESS OF WATER SAMPLE.</p> <p>7.1 Collect water sample.</p> <p>7.2 Preserve water sample.</p> <p>7.3 Take water into a beaker.</p> <p>7.4 Set the apparatus.</p> <p>7.5 Add reagents and do titration.</p> <p>7.6 Take reading.</p> <p>7.7 Maintain the record of performed job.</p>	1	2
8	<p>MEASURE RESIDUAL CHLORINE WATER SAMPLE USING FIELD KITS</p> <p>8.1 Collect water sample.</p> <p>8.2 Preserve water sample.</p> <p>8.3 Take water into a beaker.</p> <p>8.4 Set the apparatus.</p> <p>8.5 Take reading.</p> <p>8.6 Maintain the record of performed job.</p>	1	2
9	<p>IDENTIFY DIFFERENT PARTS OF NO. 6 HAND PUMP</p>	1	2

	<p>9.1 Collect no.6 hand pump.</p> <p>9.2 Identify the different components of no.6 hand pump.</p> <p>9.3 Identify different components of no.6 hand pump.</p> <p>9.4 Sketch different components of no.6 hand pump.</p> <p>9.5 Maintain the record of performed job.</p>		
10	<p>PERFORM SHOWER LINE</p> <p>10.1 Collect pipe and fittings. Collect tools and Personal Protective Equipment's.</p> <p>10.2 Perform threading.</p> <p>10.3 Perform joint.</p> <p>10.4 Set fittings and accessories.</p> <p>10.5 Clean and restore tools and material.</p> <p>10.6 Maintain the record of performed task.</p>	2	3
11	<p>SET A BASIN</p> <p>11.1 Collect pipe and fittings and fixture.</p> <p>11.2 Collect tools and Personal Protective Equipment's.</p> <p>11.3 Set basin.</p> <p>11.4 Perform connection.</p> <p>11.5 Set fittings and accessories.</p> <p>11.6 Clean and restore tools and material.</p> <p>11.7 Maintain the record of performed task.</p>	3	4
		16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
01	Arsenic Test kits	5 set
02	Auto titration	5 set
03	Colorimeter	2 set
04	Hardness Test kits	5 set
05	Magnetic starrer	5 set
06	pH Meter	5 set
07	TDS Meter	5 set
08	Thermometer	5 set
09	TSS Meter	5 set
10	Die Stock (thread Cutting for Outer Side)	5 set
11	Tape (thread Cutting for inner Side)	5 set
12	Hack saw	5 Nos.
13	Pipe cutter	5 Nos.
14	Pipe wrench	5 Nos.
15	Auto Pipe threading machine	5 Nos.
16	Pipe cleaner	5 Nos.
17	PPR welding machine	5 Nos.
18	Reamer	5 Nos.
19	Pipe Vice	5 Nos.
20	Mallet	5 Nos.
21	Try Square	5 Nos.
24	Adhesive	5 Nos.

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Water supply and sanitation. (Environmental Engineering)	Rangawala, S.C (2009):	Publisher: Charotar Publishing House
02	A Text Book of water supply engineering	Dr. M.A. Aziz	Hafiz book Center Dhaka
03	Water Supply & Sanitation: Rural and Low-Income Urban Communities, ITN- Bangladesh Publication.	M Feroze Ahmed Md. Mujibur Rahman	ITN-Bangladesh
04	Water Quality and Treatment –A Hand book community water Suppliers	Raymond D. Letterman	American Water Works Association

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	https://www.youtube.com/watch?v=HEXfLxLa5ME	Job no.-1
02	https://www.youtube.com/watch?v=DcXDc3cf7jc	Job no.-2
03	https://www.youtube.com/watch?v=WuIEfG_9a_A	Job no.-3
04	https://www.youtube.com/watch?v=y4UF9leT8Ow	Job no.-4
05	https://www.youtube.com/watch?v=dKTQtxmD2vM	Job no.-4,5
06	https://www.youtube.com/watch?v=VCRvDTg4f1I	Job no.-6
07	https://www.youtube.com/watch?v=tHy72-yDIaG&t=39s	Job no.-8
08	https://www.youtube.com/watch?v=sBOMefeTg1c	Job no.-09
09	https://www.youtube.com/watch?v=B6tRrjwBEEo	Job no.-10,11

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
26456	Hydraulics	T	P	C
		2	3	3

Rationale	<p>Hydraulics is one of the important subjects of Civil Engineering diploma graduate. Its content Fluid pressure, Buoyancy, Principles of flow of fluid, Flow through Orifices and Mouthpieces, L head losses of flowing liquid, Friction and flow through pipes, Flow of liquid through Notches and Weirs, Flow of liquid through Open channel, Measurement of velocity and discharge of flow by current-meter and float.</p> <p>After completion the course, student will be able to know characteristic of fluid, fluid pressure, different type of head losses, friction and should perform have to operate different type of velocity measuring equipment, measuring of velocity of Notches, Weir, Open channel and discharge of fluid. Therefore, the subject of Hydraulics is very important for Civil Engineering diploma graduate.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Describe fluid and Fluid pressure. 2. Compute fluid pressure using Piezometer and Manometer. 3. Calculate center of pressure and total pressure on different immersed plane surface. 4. State buoyancy. 5. Describe different types of flow and head. 6. Discuss concept of Bernoulli's theorem. 7. Describe flow through Orifice and Mouthpiece. 8. Describe different types of head losses of flowing fluid. 9. Describe friction and flow through pipes. 10. Describe flow through Notches and Weirs. 11. Describe flow of liquid through Open channel.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Measure pressure at a particular section/point of a tank or pipe line by a piezometer. 2. Measure pressure at a particular section/point of a tank or pipe line by a simple manometer. 3. Measure pressure between two sections of a flowing liquid by differential manometer. 4. Measure pressure between two sections of a flowing liquid by inverted differential manometer. 5. Apply Bernoulli's theorem. 6. Measure discharge through a pipe by venturi meter. 7. Determine coefficient of discharge (Cd), coefficient of velocity (Cv) and coefficient of contraction (Cc). 8. Measure discharge through a triangular notch (V-notch) and determine the coefficient of discharge. 9. Measure the loss of head due to friction in pipe. 10. Measure the loss of head due to sudden enlargement and sudden contraction of pipe. 11. Observe different types of flow in a typical open channel. 12. Measure the velocity of flow with a pitot tube.

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	FLUID AND FLUID PRESSURE 1.1 Define fluid, fluid mechanics and hydraulics. 1.2 Differentiate between liquid and gas. 1.3 Define density of fluid and specific weight. 1.4 Mention the application of hydraulics. 1.5 State the meaning of pressure, intensity of pressure, pressure head and static head of liquid. 1.6 Define free surface of liquid, atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. 1.7 Compute the intensity of pressure and total pressure in a water. 1.8 Explain the working principle of a hydraulic ram. 1.9 Calculate the weight lifting capacity of ram.	4	7
2	MEASURING TECHNIQUE OF THE FLUID PRESSURE 2.1 Define various types of measuring device for measuring the fluid pressure. 2.2 Outline the specific uses and limitations of each fluid pressure measuring devices. 2.3 Compute liquid pressure using piezometer. 2.4 Compute liquid pressure using simple manometer. 2.5 Compute difference of fluid pressure between two sections of a pipe line using differential manometer. 2.6 Compute difference of fluid pressure between two sections of a pipe line using inverted differential manometer.	3	6
3	TOTAL PRESSURE AND CENTER OF PRESSURE ON IMMERGED PLANE SURFACE 3.1 Explain total pressure and center of pressure. 3.2 Explain total pressure on horizontally immersed plane surface. 3.3 Explain total pressure and center of pressure on vertically immersed plane surface. 3.4 Explain center of pressure on inclined immersed surface. 3.5 Compute on horizontally immersed plane surface. 3.6 Deduce the formula to compute total pressure and center of pressure on vertically immersed surface. 3.7 Compute total pressure and center of pressure on inclined immersed surface.	3	6
4	BUOYANCY 4.1 Define buoyancy and center of buoyancy. 4.2 State metacenter and metacentric height. 4.3 Mention the conditions of equilibrium of a floating body. 4.4 Compute the metacentric height using experimental formula.	2	4

5	<p>FLOW OF LIQUID UNDER DIFFERENT CONDITIONS</p> <p>5.1 Define various types of fluid flow. 5.2 Explain discharge. 5.3 State the equation of continuity of liquid flow. 5.4 Explain datum head, velocity head, pressure head and total head of a liquid.</p>	3	5
6	<p>BERNOULLI'S THEOREM</p> <p>6.1 State the Bernoulli's theorem. 6.2 Prove the Bernoulli's theorem. 6.3 Describe construction of venturi meter and pitot tube. 6.4 Compute the discharge in a given pipe line by using venturi meter. 6.5 Compute velocity and discharge in a section of a flowing liquid by using a pitot tube.</p>	3	6
7	<p>FLOW THROUGH ORIFICE AND MOUTHPIECE</p> <p>7.1 Define Orifice, Mouthpiece, jet of water and Venacontracta. 7.2 State the meaning of coefficient of contraction (Cc), coefficient of velocity (Cv) and coefficient of discharge (Cd). 7.3 Relate between Cc, Cv and Cd. 7.4 Calculate the time of emptying a rectangular tank and hemispherical vessel through orifice. 7.5 Explain the functions of Orifice and Mouthpiece. 7.6 Distinguish between external and internal mouthpieces.</p>	2	6
8	<p>HEAD LOSSES OF FLOWING LIQUID</p> <p>8.1 Mention different types of head loss of flowing fluid. 8.2 Explain Loss of head due to friction in pipe for flowing liquid. 8.3 Describe Loss of head due to bends and elbows for flowing liquid. 8.4 Explain Loss of head due to sudden contraction of pipe for flowing liquid. 8.5 Explain Loss of head due to sudden enlargement of pipe for flowing liquid. 8.6 Explain Loss of head at entrance to pipe for flowing liquid. 8.7 Describe Loss of head due to obstruction. 8.8 Calculate loss of head at exit from pipe.</p>	2	4
9	<p>FRICTION AND FLOW THROUGH PIPES</p> <p>9.1 Describe friction of fluid flowing through pipes. 9.2 State the Chezy's formula for loss of head due to friction in pipes. 9.3 State the Darcy's formula for loss of head due to friction in pipes. 9.4 Calculate the loss of head due to friction in pipes using Chezy's formula. 9.5 Calculate the loss of head due to friction in pipes using Dracy's formula</p>	3	5

10	<p>FLOW THROUGH NOTCHES AND WEIRS</p> <p>10.1 Define notch and weir.</p> <p>10.2 Mention different types of notches and weirs.</p> <p>10.3 Differentiate between weir and notch.</p> <p>10.4 Outline the advantages of triangular notch over rectangular notch.</p> <p>10.5 State the formulae for measuring discharges through rectangular notch, V-notch and trapezoidal notch.</p> <p>10.6 Calculate the discharge through rectangular, triangular and trapezoidal notch using discharge formula.</p> <p>10.7 State Francis' formula for discharge through a rectangular weir.</p> <p>10.8 State Bazin's formula for discharge through a rectangular weir.</p> <p>10.9 Calculate the discharge through rectangular weir using Francis' formula.</p> <p>10.10 Calculate the discharge through rectangular weir using Bazin's formula.</p>	4	6
11	<p>FLOW OF LIQUID THROUGH OPEN CHANNEL</p> <p>11.1 Describe open channel, wetted perimeter, hydraulic radius, Laminar and turbulent flow, Reynold's number, hydraulic jump, critical depth, Critical velocity and hydraulic gradient.</p> <p>11.2 State the different types of open channels.</p> <p>11.3 State the Chezy's formula for velocity of flow in open channel.</p> <p>11.4 State the Manning's formula for velocity of flow in open channel.</p> <p>11.5 Mention conditions for most economical section of a rectangular channel.</p> <p>11.6 Mention the uses of current meter and float to determine velocity and discharge of flow.</p> <p>11.7 Calculate velocity and discharge of flow by current meter and float.</p>	3	5
Total		32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Measure pressure at a particular section/point of a tank or pipe line by a piezometer.</p> <p>1.1 Collect the required tools and equipment.</p> <p>1.2 Open the flow tube.</p> <p>1.3 Measure the distance from the datum of the pipe to junction of water and mercury due to flow pressure.</p> <p>1.4 Connect the piezometer tube to the pressure pipe of the flow.</p> <p>1.5 Measure the depth of the mercury column from the surface.</p> <p>1.6 Calculate the required water pressure.</p>	1	2

	1.7 Maintain the record of performed task.		
2	<p>Measure pressure at a particular section/point of a tank or pipe line by a simple manometer.</p> <p>2.1 Collect the required tools and equipment. 2.2 Connect simple manometer with flowing pipe. 2.3 Open the key of flowing pipe. 2.4 Observe the level mercury in both pipes. 2.5 Record the level of both pipes. 2.6 Calculate the difference of level to find the water pressure. 2.7 Maintain the record of performed job.</p>	1	2
3	<p>Measure pressure between two sections of a flowing liquid by different manometer.</p> <p>3.1 Collect a differential manometer. 3.2 Connect differential manometer with flowing two pipe. 3.3 Open the key of flowing pipe. 3.4 Observe the level mercury in both pipe of manometer. 3.5 Record the level of both pipes. 3.6 Calculate the difference of level to find the water pressure. 3.7 Maintain the record of performed job.</p>	1	2
4	<p>Measure pressure between two sections of a flowing liquid by inverted differential manometer.</p> <p>4.1 Collect an inverted differential manometer. 4.2 Connect inverted differential manometer with flowing two pipe. 4.3 Open the key of flowing pipe. 4.4 Observe the level mercury in both pipe of manometer. 4.5 Record the level of both pipes. 4.6 Calculate the difference of level to find the water pressure. 4.7 Maintain the record of performed job.</p>	1	1
5	<p>Apply Bernoulli's theorem</p> <p>5.1 Collect a taper pipe with Dai-meter 30cm and 20cm 5.2 Connect one end with motor and other end with pump. 5.3 Start motor and flow fluid with pressure. 5.4 Collect fluid in tank recording by stop watch. 5.5 Analysis the data. 5.6 Demonstrate the Bernoulli's Theorem. 5.7 Observe the result. 5.8 Maintain the record of performed job.</p>	2	2
6	<p>Measure discharge through a Pipe Line Venturi Meter.</p> <p>6.1 Collect the required tools and equipment. 6.2 Connect two pipes on the both sides of venturi meter. 6.3 Connect the motor and pump to one end of the pipe. 6.4 Start motor. 6.5 Identify mercury column with the variometer. 6.6 Prepare result using required formula. 6.7 Maintain the record of performed job.</p>	2	2
7	<p>Determine coefficient of discharge (Cd), coefficient of velocity (Cv) and coefficient of contraction (Cc).</p> <p>7.1 Collect the required tools and equipment.</p>	2	3

	<p>7.2 Place water tank with orifice in fixed location.</p> <p>7.3 Place supply water pipe in a fixed height from tank.</p> <p>7.4 Start motor for water supply.</p> <p>7.5 Full the Water tank.</p> <p>7.6 Discharge water through orifice.</p> <p>7.7 Measure constant water height when water flow come to stable Condition.</p> <p>7.8 Measure horizontal and vertical distance of a water particle from of Venacontracta of jet.</p> <p>7.9 Determine different hydraulic co-efficient using the formula.</p> <p>7.10 Maintain the record of performed job.</p>		
8	<p>Measure discharge through a triangular notch(V-notch) and determine the coefficient of discharge.</p> <p>8.1 Connect the motor and pump.</p> <p>8.2 Start motor.</p> <p>8.3 Flow Water through the v-notch.</p> <p>8.4 Measure its height during flow with v-notch.</p> <p>8.5 Compute result using required formula.</p> <p>8.6 Maintain the record of performed job</p>	2	2
9	<p>Measure the loss of head due to friction in pipe.</p> <p>9.1 Collect the required tools and equipment.</p> <p>9.2 Determine the velocity of the flow with the meter.</p> <p>9.3 Measure the length of the flow pipe with measuring tools.</p> <p>9.4 Measure the diameter of the pipe.</p> <p>9.5 Establish result using required formula.</p> <p>9.6 Maintain the record of performed job.</p>	1	2
10	<p>Measure the loss of head due to sudden enlargement and sudden contraction of pipe.</p> <p>10.1 Select a pipe of specific cross section.</p> <p>10.2 Determine the length and diameter of pipe.</p> <p>10.3 Determine the velocity of liquid with current meter.</p> <p>10.4 Prepare result using required formula.</p> <p>10.5 Maintain the record of performed job.</p>	1	2
11	<p>Observe different types of flow in a typical open channel</p> <p>11.1 Collect a rectangular open water channel.</p> <p>11.2 Start water flow through open channel.</p> <p>11.3 Measure the discharge with stop watch for a specific time.</p> <p>11.4 Maintain the record of performed job.</p>	1	3
12	<p>Measure the velocity of flow with a pitot tube</p> <p>12.1 Collect a Pitot tube.</p> <p>12.2 Collect an open channel.</p> <p>12.3 Place Pitot tube with against to water flow.</p> <p>12.4 Measure depth of flowing water level.</p> <p>12.5 Measure height of water from flowing water in tube.</p> <p>12.6 Determine velocity by using formula.</p> <p>12.7 Maintain the record of performed job.</p>	1	2
	Total	16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT AND MACHINERY):

Sl.	Item Name	Quantity
<u>HAND TOOLS AND MATERIALS:</u>		
1	Measuring scale	5 Nos.
2	Caliper's	5 Nos.
3	Machine oil	5 Lit
4	Jar	5 Nos.
5	Mog	5 Nos.
6	Wastage Jute	10 kgs
7	Stop Watch	5 nos.
8	Tapper pipe	50 cm.
<u>LIST OF POWER TOOLS AND EQUIPMENT:</u>		
9	Simple Manometer	5 nos.
10	Piezometer	5 nos.
11	Differential Manometer	5 nos.
12	Inverted Differential Manometer,	5 nos.
13	Water tank	2 nos.
14	Hydraulic Bench	2 Set
15	Pump	2 nos.
16	V-notch	5 nos.
17	Open Channel	1 nos.
18	Pitot tube	5 nos.
19	Venturi meter	5 nos.
20	Current meter	5 nos.

RECOMMENDED BOOKS:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Hydraulics	E.H	Laxmi Publishers, 5 th 2004
02	Civil Engineering Hydraulics BOOK	Author: Peter Wynn	Year Published: 2014 Publisher: ICE Publishing
03	Hydraulics in Civil and Environmental Engineering 6th Edition	By Andrew Chadwick, John Morfett, Martin Borthwick	Published June 8, 2021 by CRC Press
04	A textbook of Hydraulics	R.S. Khurmi	Publisher: S. Chand and company LTD.19 th 1998
05	Civil Engineering Hydraulics	Oliveira Lamos	Auris Reference Limited April 15, 2013

WEBSITE REFERENCES:

Sl	Web Link	Remarks
01	https://youtu.be/quBgFla50kw	Search here with topics
02	https://youtu.be/dj_kZKGF-rw	Search here with topics
03	https://youtu.be/0Ejifm22PrY	Search here with topics
04	https://youtu.be/QkfZ6MjVp-E	Search here with topics
05	https://youtu.be/l9R52VUVg2U	Search here with topics