Syllabus Scheme

(4th Semester)

For

DIPLOMA PROGRAMME

IN

CIVIL ENGINEERING

Subject Code For DIPLOMA PROGRAMME IN CIVIL ENGINEERING

4th Semester (Civil)

S.No.	Subject Code	Subject Name
THEORY		
1	**DP-420**	Surveying-II
2	**DP-421**	Hydraulics
3	**DP-422**	Public Health Engineering
4	**DP-423**	Concrete Technology
5	**DP-424**	Transportation Engineering
PRACTICAL		
6	**DP-425**	Surveying-II Lab
7	**DP-426**	Hydraulics Lab
8	**DP-427**	Public Health Engineering Lab
9	**DP-428**	Concrete Technology Lab
10	**DP-429**	Transportation Eng Lab

MATS School of Engineering & I.T
MATS University, Raipur
Diploma in Civil Engineering

IVth Semester

Sr. No.	Course code	SUBJECT	Periods per week			Evaluation Scheme		Total Credits
			L	T	P	IM	ESE	
THEORY								
1	DP-420	Surveying-II	4	0	0	30	70	4
2	DP-421	Hydraulics	3	1	0	30	70	3
3	DP-422	Public Health Engineering	4	0	0	30	70	4
4	DP-423	Concrete Technology	3	0	0	30	70	3
5	DP-424	Transportation Engineering	4	0	0	30	70	4
PRACTICAL								
6	DP-425	Surveying- II Lab	-	-	2	20	30	1
7	DP-426	Hydraulics Lab	-	-	2	20	30	1
8	DP-427	Public Health Engineering Lab	-	-	2	20	30	1
9	DP-428	Concrete Technology Lab			2	20	30	1
10	DP-429	Transportation Engineering Lab	-	-	2	20	30	1
TOTAL			**18**	**1**	**10**	**250**	**500**	**23**

L-Lecturer, P-Practical, ESE- End Semester Examination, IM-Internal Marks, T-Tutorial

FOURTH SEMESTER
SUBJECT: SURVEYING-II
SUBJECT CODE: DP-420

UNIT -I **Levelling**

Fundamental ,lines of a dumpy level and their relationship., Permanent adjustment of fundamental axes of a dumpy level., Types of theodilites, vernier, and digital theodolite, Component parts of a theodilite, Size of theodolite., Definitions and term related to theodolite survey., Fundamental axes of a theodolite, Temporary adjustments, Face left and face right observations, Measurement of Horizontal angle, measurement of vertical angle,
checking verticality of a line, Miscellaneous operations with theodolite, measuring direct angles, measuring deflection angles, prolonging a straight line, fixing intermediate
points. Sources of errors and their rectification

UNIT –II **Tacheometic Survey**

Principles of tacheometry, Purpose of fixed and movable stadia hairs,, Computation of constants of given instrument in field, Movable and fixed hair method of a tacheometer with staff held vertical, Computation of RL and horizontal distances of staff station for different
Positions, Tangential method
Trigonometrical Levelling, Method to determine the selective altitudes in various cases,, Computation of R.Ls using all methods.

UNIT-III **Minor Instrument**

Construction and use of optical square, hand level, abney level, box sextant, pentagraph and ceylon ghat tracer. Use of planimeter and to calculate the area of irregular figure.

UNIT-IV **Setting of Curves**

Horizontal curves, designation of curve, types of curves, elements of simple curve, offsets from long chard, offsets from chord produced and
deflection angle method, calculation for setting out curves, setting out curves on field.

UNIT -V **Modern Methods of Surveying**

Study and use of digital instruments like digital theodilite, electronic distance measuring instruments and introduction to photographic survey.

Name of Reference Books:

1.Engineering Surveying Technology : Kennie, T.J.M. and Petrie G. (Blackie & Sons Pvt. Ltd., London, 1990)
2.Surveying (Vol. II & III) : Agor, R (Khanna publications, Delhi, 1995)
3.Surveying (Vol. II & III) : Arora, K.R. (Standard Book House, Delhi, 1993)

FOURTH SEMESTER
SUBJECT: HYDRAULICS
SUBJECT CODE: DP-421

UNIT - I **Introduction**

Definition of liquid,, Ideal liquid and Real liquid, Mass density, Specific weight, Compressibility, Viscosity, Surface tension,, Branches of hydraulics- Hydro statics, hydro kinematics and hydrodynamics. Pressure and Its Measurement, Pressure, Pressure intensity, Variation of pressure with depth of liquid, Pressure head, Effect of shape and size of container on pressure., PASCAL's law, Types of pressure - atmospheric pressure, gauge pressure, absolute pressure,, Manometer, and differential monometer., Bourdons pressure gauge.

UNIT -II **Hydro Statics**

Total pressure on plane horizontal surface , vertical surface and inclined surface, Center of pressure and pressure distribution diagram Hydro Kinematics, Law of conservation of mass, Equation of continuity, Steady and unsteady flow, Uniform and non-uniform flow, Laminar and turbulent flow, Lines of flow, Path line, Stream line Hydro Dynamics, Various forms of energies present in liquid flow - potential energy, kinetic energy, pressure energy, total energy, Bernoulli's theorem, Limitations of Bernoulli's theorem

UNIT -III **Water Discharge Measurement**

Principles of discharge measurement through pipes, Venturimeter, Equation of discharge through venturimeter, Orifice meter, Velocity measuring instruments, Pitot tube, Current meter, Description methodOrifice and flow through orifice, Hydraulic co-efficient,, Jet trajectory, Vena contracta, Small and large orifice, Expression for discharge for free flow, Submerged flow, Time required for emptying tank., Notch sharp crested, rectangular, triangular and trapezoidal, Expression for discharge of flow through notches, Weirs - definition, description and types of weirs and Discharge calculation.

UNIT- IV **Flow Through Pipes**

Characteristics of Pipe Flow, Law of liquid friction for laminar flow and turbulent flow, Expression for head loss in pipes due to friction, Darcy's weish bach / equation., Major losses., Expressions for loss due to sudden enlargement, bends, minor losses, Flow through long pipe., Discharge in open and discharge in another reservoir, Pipes in series or compound pipe., Pipes in parallel, Hydraulic grade lines, Energy grade lines in various cases like venturimeter, sudden expansion, and convergent pipe, piping connection of two reservoirs having different water levels., Compound pipes connecting two reservoirs., Pipes connected in parallel equivalent siphon system

UNIT -V **Pumps**

Definition, understanding and description of centrifugal pump, Its components and working principles, Priming, Layout selection criteria and situations where used, Power requirement computations for centrifugal pump for given discharge and head. Reciprocating pumps - definition, description, component, working principles and situation where used, Selection of pumps, Submersible pump – description and use.

Name Reference Book :

1. A text book of fluid mechanics by R. K. Bansal (Luxmi publication)

2. A text book of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput (S. Chand andcompany)

FOURTH SEMESTER
SUBJECT: PUBLIC HEALTH ENGG.
SUBJECT CODE: DP-422

UNIT-I **Introduction,**

Natural and man made hydrological cycles as applied to P.H.E, Duties of Public Health Engineer.

Quantity of Water, Population forecast by AP, GP and incremental methods, Criteria for method selection, Factors influencing demand rate, Variations in demand, I.D. demand rates for few types of buildings, Design period, Fire demand, Total water demand of a city.

Sources of Water:- Types of sources - surface water, ground water, open well, tube well infiltration well, infiltration gallery, infiltration pipes, Construction of dug well, Construction of tube well by population method, core drilling method and rotary drilling method, Well developments, Will testing, Yield of well.

Quality of Water, Effects of different impurities on water / surface gound water, Water borne diseases, Standards of potable water, Interpretation of test results, Portion on sampling and testing.

UNIT –II

Pumps:- Submersible and air lift pumps, Section of pumps, Characteristic curves of Centrifugal pumps, WHP and BHP.

Pipes and Pipes Specials, Type of pipes and their comparison. Joints- socket, spigot and flanged, Concrete pipe, collar joints, Semi flexible and rigid joints for acc pipes, Intake**,** Functions, Location:- river, canal, reservoir and lake intakes

UNIT -III

Water Treatment Process

Steps of treatment, Flow diagram, Coagulation, Commonly used coagulants, Comparison, Jar test, Coagulant mixing, Flocculation, Settling tanks- rectangular with or without mixing channel, circular with longitudinal horizontal flow, Filters- slow sand, rapid, gravity and pressure filter, Construction, Working, Specification, Comparison, Use., Disinfections

Distribution System

Component types, Functions, Functional sketch of service reservoir, Requirements and types of distribution systems, Valves-sluice, Reflux, Air release, air enter, Butterfly and hydrant column (functions and uses)

UNIT –IV

Sewage and Sewarage, Characteristics of sewage, System of sanitation, patterns of collection system.

Amount of sewage- Estimation of domestic and storm sewage, Sewage Treatment- Preliminary and Secondary Treatment systems.

UNIT –V

Sewage sludge treatment-Importance, amount and characteristics of sludge, Methods of Sewage Disposal Solid waste management, source and characteristics, environmental and health implications,refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods.Collection and disposal of refuse, Composting of refuse.

Name of Reference Books:

1.Water Supply Engineering – S.K. Garg (Khanna Publication).
2 .Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi

FOURTH SEMESTER
SUBJECT: CONCRETE TECHNOLOGY
SUBJECT CODE: DP-423

UNIT -I Introduction

Concrete and its ingredients and their functions, Various mixes and grades, Various types of concrete and their uses, Types of cement and their properties

UNIT –II Types of Cement and Admixtures

Ordinary Portland cement, Rapid hardening cement, Quick setting cement, Low heat cement, Portland pozzolana cement, Colored cement, High strength cement, High alumina cement, Sulphate resistant cement, Chemical composition, properties and uses of various types of additives & admixtures-uses and function, Heat of hydration, Water requirement for hydration

UNIT-III Testing of Cement

Field testing and laboratory testing, Fineness test, Setting time test, Strength test, Soundness test, Heat of hydration test, Aggregate abrasion value test., Suitability of different aggregates for different concrete works

UNIT -IV Aggregates and Their Testing

Classification on the basis (i) source (ii) size (iii) shape (iv) texture, Strength of aggregates, Aggregate impact value, Aggregate abrasion value, Modulus of elasticity, Bulk density, Specific gravity, Absorption and moisture content, Bulking of aggregates, Measurement of moisture content of aggregates by (i) drying method (ii)
displacement method, Cleanliness, soundness of aggregates, Grading of aggregates, Sieve analysis, Specific surface and surface index, Standard grading curve., Testing of aggregates (i) flakiness index (ii) elongation index (iii) test for
determination of clay, fine silt and fine dust (iv) specific gravity test (v) bulk
density and voids (vi) test for aggregate crushing value (vii) ten percent fines
value test (viii) aggregate impact value test.

UNIT –V Fresh Concrete

Workability, Factors affecting workability, Measurement of workability by (i) slump test (ii) compaction factor test (iii)
flow test (iv) vee bee consistometer test, segregation and bleeding
Strength of Concrete, Strength of concrete, Water/cement ratio, Gel/Space ratio, Gain of strength with age, Maturity concept of concrete, Effect of maximum size of aggregates on strength, Relation between compressive and tensile strength, Bond strength, Aggregate cement bond strength, High strength concrete, Joints in concrete work-their position and types, Lasting

of concrete-destructive and non destructive, Related Indian standard numbers and its contents for all ingredients of concrete

Name of Reference Books:

1.Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
2.Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)

FOURTH SEMESTER
SUBJECT: TRANSPORTAION ENGG.
SUBJECT CODE: DP-424

UNIT –I Introduction

Role of roads in national development, Improvement of roads in various fields, Development of highway system, Classification of roads as per Indian Road Congress, Road Development plans of India

UNIT –II Investigation & Planning of new Roads

Road patterns, Reconnaissance survey, Map-study and preliminary survey, Detailed objects, Marking of various alignment and various drawings and reports, Steps in a new project work

UNIT –III Road Geometric

Cross section of various types of roads as per I.R.C. design criterion, Pavement surface characteristics, Kerb and road margins, Gradient and its standard values, Camber and its standard values, Super elevation and its max., min. values, Calculation of super elevation, Radius and degree of curve, Widening of roads, Mechanical & Psychological widening, Sight distance, Stopping sight distance, Overtaking sight distance, Reaction time, Transition curves their function and purpose, Vertical curves

UNIT -IV Pavement Design Materials & Construction

Pavement "Cross-section" element and their functions,, Pavement types, Road materials and their qualities, Design factors for various types of pavements, CBR value, Material used in highway construction their qualities, Various tests of materials, Construction of earth roads,, Gravel roads, WBM Roads, Bituminous pavements,, Cement concrete pavements and joints in cement concrete pavements, Slopes, bedding, earthwork in cutting, filling, Method of giving layout.

UNIT -V Drainage of Roads,

Importance of Highway drainage & Road drainage, Requirements of road drainage system, Surface drainage system, Cross drainage and subsurface drainage, Empirical formula used in construction of roads in water logged areas, Layout of drainage system,

Traffic Engineering, Traffic surveys, Classification of traffic, Channelisations, Traffic controlling devices, Traffic signals & their classification

Name of Text Books:

1.Principle and Practices of Highway Engineering – Kadiyali & Lab (Khanna Publishers, Delhi)
2.Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi)

FOURTH SEMESTER
SUBJECT: SURVEYING-II LAB
SUBJECT CODE: DP-425

List of Practicals:

1. To fixed station point and to measure length of a line by direct ranging with the help of chain and tape and plot it.
2. To perform a chain survey of closed traverse fixing the angle between two chain lines by time lines and to plot them and adjusting the closing error by graphical method.
3. Study the parts of prismatic compass and surveyor's compass and to measure the bearings of lines joining different station point
4. To take the fore bearing and back bearing of sides of a regular polygon and to calculate included angle and check them.
5. To perform a chain and compass survey of an area by open traverse and prepare a map.
6. To learn temporary adjustment of leveling instrument and to find the R.L. of the given point.
7. To find the difference of R.L. of two given point by shifting of instrument on change points and applying arithmetical checks.
8. To take the longitudinal and cross-section levels of an existing road.
9. To study the accessories of plane table surveying and to plot the objects by radial method.
10. To perform the plan table survey of small area by intersection method.
11. To take the block leveling of undulated site and to draw the contours using method of interpolation.
12. Preparing a contour map of a small area by direct method of contouring.
13. To draw contour map of a small panel and to calculate its capacity.
14. To study a Topo sheet of certain area and to mark on it watershed line and find out catchments area of a stream at a place.

FOURTH SEMESTER
SUBJECT: HYDRAULICS LAB
SUBJECT CODE: DP-426

List of Practicals:

1. Pressure measurement at a point. To measure difference of pressure between two given points by U tube manometer and differential manometer.
2. Determination of Hydraulic coefficients Cc , Cv and Cd
3. Determine discharge through venturimeter.
4. Determine discharge through orific e meter.
5. Plotting hydraulic gradient line and total energy line.
6. Verification of Bernoulli's theorem.
7. Determine time of emptying tank
8. Determine friction loses through pipes
9. Determine losses in pipe due to sudden enlargement and sudden contraction
10. Determine discharge through open channel
11. Study the working of
    a. Reciprocating pump
    b. Centrifugal pump
    c. Submersible pump

FOURTH SEMESTER
SUBJECT: PUBLIC HEALTH ENGINEERING LAB
SUBJECT CODE: DP-427

Field Visits:
Student will have to undergo for technical visit to the following works:

1. Water treatment plant
2. Intakes site and adjoining pumping stations
3. Sewage treatment plants.

NOTE: STUDENTS SHOULD SUBMIT A REPORT ON VISIT AND A PRACTICAL EVALUATION SHOULD BE CONDUCTED.

FOURTH SEMESTER
SUBJECT: CONCRETE TECHNOLOGY LAB
SUBJECT CODE: DP-428

List of Practicals / Tutorials:

1. Fineness test on cement by sieving .
2. Determination of initial setting time of cement.
3. Determination of final setting time of cement.
4. Soundness test on cement.
5. Test for determination of flakiness index.
6. Test for determination of specific gravity.
7. Test for determination of bulk density and voids.
8. Test for determination of aggregates crushing value.
9. Test for determination of aggregates impact value.
10. Determination of workability by slump test.
11. Determination of compressive strength of concrete cubes.
12. Mix design of concrete by Indian standard method.

FOURTH SEMESTER
SUBJECT: TRANSPORTATION ENG LAB
SUBJECT CODE: DP-429

List of Practicals / Tutorials:

1. To determine Grading of coarse aggregate
2. To determine Impact value of given aggregate
3. To determine Crushing value of given aggregate
4. To determine Abrasion value of given aggregate
5. To determine Specific gravity of given aggregate
6. To determine Flakiness and Elongation index of given aggregate
7. To determine Penetration value of Bitumen/Tar
8. To determine Ductility test of Bitumen/Tar
9. To determine Flash and Fire point of Bitumen/Tar
10. To determine Softening point of Bitumen/Tar
11. To determine Viscosity test of Bitumen/Tar
12. To conduct CBR test of sub base and sub-grade materials
13. Study of Marshall Stability Test apparatus
14. Study of Blenkan Man's Beam Test apparatus.

- A Highway Engineering Project which includes different types of survey, preparation of Alignment Plan, L- Section & X-Section of Road
- Testing for highway construction materials