

Estd. Under Jharkhand State Private University Act

Syllabus of Diploma in Civil Engineering (POLYTECHNIC-CE) Semester-I, II, III, IV, V & VI (Batch 2020-2022)

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G ARKA JAIN University Jharkhand

Syllabus of Diploma in Civil Engineering Semester-I

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ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

Sr. No. Subject Group L-T-P Credit Mathematics-I A & B 3-1-0 4 1 2 Communication Skills in English Α 3-0-0 3 Fundamentals of Electrical & Electronics В 3-1-0 4 Engg. 3 **Applied Physics** Α 3-1-0 4 Introduction to IT system В 3-0-0 3 4 Applied Chemistry 3-1-0 4 Α Engineering Mechanics 3-1-0 4 B 5 **Environmental Science** В 2-0-0 0 PRATICAL **Applied Physics Lab** 0-0-1 6. Α 1 Fundamentals of electrical & electronics В 0-0-1 1 Engg. Lab 7. Applied Chemistry Lab Α 0-0-1 1 Introduction to IT system Lab В 0-0-1 1 8. Communication Skills in English Lab 0-0-1 1 А Engineering Mechanics Lab В 0-0-1 1 9. Engineering Workshop Practice 0-0-2 2 Α **Engineering Graphics** В 0-0-2 2 Total A or B 23-5-10 36

<u>SEMESTER –I</u>

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

Sr. No.	Subject	Group	L-T-P	Credit
1	Mathematics-II	A & B	3-1-0	4
2	Communication Skills in English	В	3-0-0	3
	Fundamentals of Electrical & Electronics Engg.	А	3-1-0	4
3	Applied Physics	В	3-1-0	4
	Introduction to IT system	А	3-0-0	3
4	Applied Chemistry	В	3-1-0	4
	Engineering Mechanics	А	3-1-0	4
5	Environmental Science	А	2-0-0	0
	PRATICAL			
6.	Applied Physics Lab	В	0-0-1	1
	Fundamentals of electrical & electronics Engg. Lab	А	0-0-1	1
7.	Applied Chemistry Lab	В	0-0-1	1
	Introduction to IT system Lab	А	0-0-1	1
8.	Communication Skills in English Lab	В	0-0-1	1
	Engineering Mechanics Lab	А	0-0-1	1
9.	Engineering Workshop Practice	В	0-0-2	2
	Engineering Graphics	А	0-0-2	2
	Total	A or B	23-5-10	36

SEMESTER -II

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –I (Group-A)

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(Group-B)

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47 .5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20 5		5
2	Advanced Surveying	PCC	3	3	100	70	20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

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SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5
	Elective-II								
	Traffic Engineering								
3	Solid Waste Management	PEC	3	3	100	70	20	5	5
	Advanced Construction Technology								
	Elective-III Pavement Design & maintenance								
4	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5
	Building Services and Maintenance								
	Open Elective-I Engineering Economics &								
5	Accountancy	OEC	3	3	100	70	20	5	5
0	Renewable Energy Technologies								
	Numerical Methods								
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5
	Practical								
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0
	TOTAL		24	24	900	630	190	40	40

Project to be carried over to next semester

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SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance	
1	Public Health Engineering	HSMC	3	3	100	70	20	5	5	
	Elective-IV									
	Repairs and Maintenance of Structures				100					
2	Advanced Design of Structures	PEC	3	3		70	20	5	5	
	Tendering and Accounts									
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5	
	Open Elective-II									
	Project Management	OEC								
4	Disaster Management		3	3	100	70	20	5	5	
	Operations Research									
	Open Elective-III									
	Sustainable Development	OEC								
5	Artificial Intelligence		3	3	100	70	20	5	5	
	History of Science and Engineering									
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5	
	Practical									
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5	
7	Seminar	PROJ	1	2	50	35	5	5	5	
8	Major Project-II	PROJ	3	0	100	100	0	0	0	
	TOTAL		21	20	700	520	110	35	35	

Syllabus of the Program-Diploma in Civil Engineering - SEM I, II, III, IV, V & VI (Batch 2020-23)

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	19
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	50
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	7	16
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
	Total	59	132

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card. The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

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PROGRAM ARTICULATION MATRIX

SE M	E COURSE PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES I CODE PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES												
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Communication Skills in English –DIP11149			1	1		1			1	1		
	Mathematics-I – DIP11001	1	1	1	2	1		1			1		
Ι	Applied Physics –DIP11147	2	1	3	2								
	Applied Chemistry –DIP11145	1	1			1	1				1		1
	Engineering Workshop Practice –DIP11151	1	1	1	1		1			1			
	Applied Physics Lab –DIP11148	1	1	3	2		1						
	Applied Chemistry Lab -11146			1	1		1					1	
	Communication Skills in English Lab–DIP11150	1		1	1		1	1	1	1			
	Mathematics -II –DIP12008	1	1	1	1	1						1	
	Fundamentals of Electrical & Electronics Engg. –DIP12278	1	1	1	2	1					1	1	1
	Introduction to IT system -DIP12157	1		2	3		1			1	2		
II	Engineering Mechanics –DIP12153	3	3		3						3		3
	Environmental Science – DIP12155					2	3				2		
	Fundamentals of electrical & electronics Engg. Lab –DIP12156	1	2	2	3	2		2					
	Introduction to IT system Lab –DIP12279	1		2	3		1			1	2	1	
	Engineering Mechanics Lab –DIP12154	1	2	2	3	2		2					
	Engineering Graphics - DIP12152	2	1		1							2	2
	Construction Material –DIP13164	3	3	1			1					3	2
	Basic Surveying –DIP13016	3	3	3	3	3	2	1	1	3	3	3	2
	Mechanics of Materials-DIP13175	3	3	3							1	3	1
	Building Construction –DIP13159	3	3	1			1					3	2
	Geotechnical Engineering –DIP14023	2	3	3	2	2	2				2	3	1
III	Essence of Indian Knowledge and Tradition (mandatory Course)- DIP13172	2	3					2			1	2	2

	Construction Material Lab –DIP13165	2	3	3	2						1	3	2
	Mechanics of Materials Lab –DIP13176	3	3	3	4						1	3	2
	Geotechnical Engineering-Lab –DIP14029	2	3	2	2					3	3	3	2
	Basic Surveying-Lab –DIP13019	2	3	3	2						2	3	2
	Summer Internship-1(3-4 Weeks) –DIP13177												
	Hydraulics –DIP14192	3	3	2	2	1	1	-	-	-	-	3	-
	Advanced Surveying –DIP14021	2	3	3	2	-	-	-	-	-	1	3	1
	Theory of Structure –DIP15032	2	3	2		-	-	-	-	-	1	3	1
	Transportation Engineering –DIP14210	2	3	3	2	-	-	-	-	-	1	2	1
IV	Concrete Technology –DIP13015	1	3	3	2	I	-	-	-	-	-	3	1
	Elective-I Precast and Prestressed Concrete – DIP14204	1	2	2	I	-	-	-	-	-	I	2	2
	Construction & Project Management –DIP14186	1	3	2	1	1	-	-	-	-	-	1	3
	Rural Construction Technology –DIP14205	2	2	2	2	1	-	-	-	-	1	1	3
	Concrete Technology-Lab –DIP13020	1	2	3	2	-	-	-	-	-	2	3	2
	Building Planning & Drawing-Lab –DIP14183	1	2	2	1	-	-	-			1	2	1
	Advanced Surveying-Lab –DIP14028	2	3	3	-	-	-	-	-	-	1	2	3
	Transportation Engineering-Lab -14211	2	3	3	2	-	-	-	-	-	1	2	1
	Hydraulics-Lab –DIP14193	2	3	3	-	-	-	-	-	-	Ι	2	3
	Minor Project –DIP14203											1	1
	Design of steel & RCC structure–DIP15283	2	3	2	2	2	1	-	1	-	2	3	2
	Estimation Costing & Valuation-DIP15284	2	3	1	1	2	1	2	1	2	2	3	3
	Elective-II Traffic Engineering –DIP15247 Solid Waste Management –DIP15243 Advanced Construction Technology –DIP15214	2	3	2	3	3	2	1	1	1	2	3	2
	Elective-III Pavement Design & maintenance –DIP15241 Green Building and Energy Conservation Building Services and Maintenance -DIP15228	1	3	2	2	2	3	2	2	-	3	3	3

Open Elective-I	3	1	1	-	-	-	2	2	1	1	2	3
Engineering Economics & Accountancy –DIP15223												
Renewable Energy Technologies –DIP15251												
Numerical Methods –DIP15239												
Water Resource Engineering –DIP15248	1	3	2	1	3	2		2	1	2	3	2
Design of steel & RCC structure-Lab –DIP15221	2	3	3	2	1	2		1		2	3	1
Estimation Costing & Valuation-Lab –DIP15224	1	3	1	1	3	1	3	2	1	2	3	3
Summer Internship-II(4-6 Weeks) –DIP15244												
Major Project-I (Project to be carried over to next semester) – DIP15236												
Public Health Engineering –DIP16272	2	3	2	2	3	3	1	1	1	2	3	2
Elective-VI	2	3	2	2	3	3	1	3	2	2	3	2
Repairs and Maintenance of Structures –DIP16258												
Advanced Design of Structures –DIP16252												
Tendering and Accounts –DIP16277												
Entrepreneurship and Start-ups –DIP16265	2	-	1	-	2	-	2	3	2	2	1	3
Open Elective-II	2	2	1	2	2	1	-	2	1	1	1	2
Project Management –DIP16257												
Disaster Management -DIP16254												
Operations Research – DIP15240												
Open Elective-III	3	1	-	2	2	-	2	3	2	1	1	3
Sustainable Development –DIP16276												
Artificial Intelligence –DIP16253												
History of Science and Engineering –DIP16255		_			_							
Indian constitution –DIP16266					3	2	3		2			
Public Health Engineering-Lab -	2	3	2	3	3	3	1	1	1	2	2	2
Seminar –DIP16274											1	
Major Project-II –DIP16267											1	
ERAGE							1		1			

Subject: Mathematics-I

Code: DIP11001

4 Credits | Semester 1

A. Introduction:

- To develop logical understanding, mathematical skill of the subject.
- To make aware students about importance and relation between mathematics and engineering
- To gives sufficient basic concepts for future applications in different subjects

B. Course Outcomes: At the end of the course, students will be able to

[C01] Remembering the concept of Vectors and use of vectors in mathematics

[CO2] Understand, predict and optimize engineering systems.

[CO3] Analyze vectors in geometrically and algebraically.

[CO4] Analyzing about different forms of the equation of straight line and curves

[C05] Evaluating why mathematical thinking is valuable in daily life.

Criteria	Description	Maximum Marks					
Continuous Intern	I Internal Examination	20					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semest	r End Semester Examination	70					
Examination (ESE)							
Total		100					
Attendance	A minimum of 75% Attendance	A minimum of 75% Attendance is required to be maintained by a					
	student to be qualified for taking	g up the End Semester examination.					
	The allowance of 25% includes a	ll types of leaves including medical					
	leaves.						

C. Assessment Plan:

D. SYLLABUS

TRIGONOMETRY: Concept of angles, measurement of angles in degrees, grades and radians and their conversions,). T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versaT- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and e^x .

ALGEBRA: Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number.

Addition, Subtraction, Multiplication Division of a complex number. De-movier's theorem and., its applicationPartial fractions: Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

Permutations and Combinations: Fundamental rules of counting, Value of nPr

Value of nCr.**Binomial theorem:** Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems

CO-ORDINATE GEOMETRY: Straight lines: Different forms of equations of straight lines:

y = mx + c, $y - y_1 = m(x - x_1)$, $y - y_1 = \left(\frac{y_2 - y_1}{x_2 - x_1}\right)(x - x_1)$. General equation of a lineax + by + c = o (graphical representation and statements) and problems on above equations. Equation of lines through a point and parallel or perpendicular to a given line. Problems. **Conic Section:** Definition of conic section. Definition of axis, vertex, eccentricity, focus and length of latus rectum. Equation and Geometrical representation of parabolaEquations of ellipse and hyperbola. Finding axes, vertices, eccentricity, foci and length of lattice rectum of conics. Problems on finding the above said equations with direct substitutionGeneral equation of a circle and its characteristics. To find the equation of a circle, giveni. Centre and radius,ii. Three points lying on it andiii. Coordinates of ends of a diameter;

VECTORS: Definition of vector. Representation of vector as a directed line segment. Magnitude of a vector. Types of vectors. Position vectorExpression of vector by means of position vectors. Addition and subtraction of vectors in terms of line segment. Vector in plane and vector in a space in terms of unit vector i, j and k respectivelyProduct of vectors. Scalar product and vector product of two vectors. Geometrical meaning of scalar and vector product. Applications of dot (scalar) and cross (vector) productsProjection of a vector on another vector. Area of parallelogram and area of triangle.

E. TEXT BOOKS

T1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition2007.

F. REFERENCE BOOKS

- R2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
- R3. NCERT Mathematics Text books of class XI and XII.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES				CORRELATION WITH PROGRAM SPECIFIC OUTCOMES							
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Remembering the concept of Vectors and use of vectors in mathematics	2		1									
[CO2]	Understand, predict and optimize engineering systems.		1		1								
[CO3]	Analyze vectors in geometrically and algebraically				1	1							
[CO4]	Analyzing about different forms of the equation of straight line and curves							1			1		
[CO5]	Evaluating why mathematical thinking is valuable in daily life									1	1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Communication Skills in English

Code: DIP11149 Credit - 3 | Semester 1

A. Introduction:

• To introduce students to the understanding of English language and its usage in their field of engineering. It helps the students to enhance their ability to read, write and speak English well.

B. Course Outcomes: At the end of the course, students will be able to

- **[CO1]** Learn the different forms & type of communication.
- **[CO2]** Learn the writing formats and letter story.
- [CO3] Learn the Reading comprehension
- [CO4] Learn Grammar and Vocabulary
- [CO5] Learn Soft skills and Professional Excellence.

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking	up the End Semester examination.						
		The allowance of 25% includes all types of leaves including med							
		leaves.							

D. SYLLABUS

COMMUNICATION: THEORY AND PRACTICE: Basics of communication: Introduction, meaning and definition, process of communication etc.Types of communication: formal and informal, verbal, non-verbal and written Barriers to effective communication**7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct, and courteous).Art of Effective communicationchoosing words, Voice, Modulation, Clarity, Time, Simplification of words, Technical Communication.

PROFESSIONAL WRITING: The art of precise writing, Letters: - business and personnel

READING COMPREHENSION BASED ON FOLLOWING TEXTS:Malgudi days: r.kNarayan, The room on the roof; ruskin bond, The gift of the magi by o. Henry, Night of the scorpion: nizzimezekeil, Stopping by woods on a snowy evening: robert frost

VOCABULARY AND GRAMMAR: Vocabulary of commonly used, Glossary of administrative terms (English and Hindi), One-word substitution, Idioms and phrases etcnelsParts of speech, active and passive voice, tenses etc., Punctuation, subject of agreement, preposition, articles

SOFT SKILLS FOR PROFESSIONAL EXCELLENCE:Introduction: Soft Skills and Hard Skills, Importance of soft skills.Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence etc., Applying soft skills across cultures, Case Studies

E. TEXT BOOKS

T1. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.

T2. Lindley Murray. An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.

T3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018).

T4. Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.

F. REFERENCE BOOKS

- R1. M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.
- R2. John Nielson. Effective Communication Skills. Xlibris, 2008.
- R3. Oxford Dictionary
- R4. Roget's Thesaurus of English Words and Phrases
- R5. Collin's English Dictionary
- R6. High school english grammar and composition- Wren and Martin (s.chand&co.)
- R7. The king's grammar- Sanjay kumarsinha (s.chand& co.)

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES					COI SPE	RELATION WITH PROGRAM CIFIC OUTCOMES					
		PO	PO	PO	PO	PO	PO	РО	PO	PO	PO	PSO 1	PSO 2
		1	2	3	4	5	6	7	8	9	10		
[CO1]	Learn the different forms & type of communication						2			2			
[CO2]	Learn the writing formats and letter story.			2									
[CO3]	Learn the Reading comprehension								2		2		
[CO4]	Learn Grammar and Vocabulary			2	2								
[CO5]	Learn Soft skills and Professional Excellence.								2				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Applied Physics Code: DIP11147

Credits- 4 | Semester 1

A. Introduction:

- Identify, formulate, and solve engineering problems by applying principles of physics.
- To give an understanding of this world both by observation and by prediction of the way in which objects behave.
- Acquire and apply new knowledge as needed, using appropriate learning strategies

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Represent physical quantities as scalar and vectors and solve real life relevant problems.

- **[CO2]** Define scientific work, energy and power and their units. Drive relationships for work, energy and power and solve related problems.
- **[CO3]** Compare and relate physical properties associated with linear motion and rotational motion and apply conservation of angular momentum principle to known problems.
- [CO4] Explain the phenomenon of surface tension, viscosity, fluid motion & Hooke's law, which helps to illustrate the properties of matter.
- **[CO5]** Apply the basic knowledge of semiconductors to illustrate the functioning of simple electronic devices &nano technology.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. Assessment Plan:

A. SYLLABUS

FORCE AND MOTION: Units and Measurements: Physical quantities; Definition of unit, types of unit (fundamental and derived) SI units: Definition, Basic and supplementary units, advantages. Scalars and Vectors: Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Lami'stheorems, Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.Force: Definition of Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun,

rockets, Impulse and its applications.Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

WORK, ENERGY AND HEAT: Work Energy & Power: Concept and units, examples of zero work, positive work and negative work .Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples). Power and its units, power and work relationship, **Numerical on work , potential and kinetic energy**), calculation of power (numerical problems), **Concept of heat & temperature**: Definitions of heat and temperature with S.I units, definition of Specific heat of substance with S I unit, equation for specific heat of a substance (no derivation).scales of temperature and their relationship, Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansionsand relation amongst them, **Transmission of heat:** Definitions of conduction, convection and radiation with examples, definition of thermal conductivity, derivation of co-efficient of thermal conductivity (K) and its S.I unit. Applications of conduction, convection and radiation, simple problems on K.**Thermodynamics**: Definition of thermodynamics, Laws of thermodynamics: Zeroth law, Istlaw and IIndlaw(only statement), types of thermodynamics process: isothermal process, adiabatic process.

ANGULAR MOTION AND WAVE MOTION: Angular and Rotational Motion: Definition of angular displacement, angular velocity and angular acceleration, relation between linear velocity and angular velocity. Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications, **Wave motion**: Transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation (y =r sin t) amplitude, phase, phase difference, principle of superposition of waves and beat formation, **Simple Harmonic Motion**: Definition of periodic motion with example, definition of Simple Harmonic Motion, SHM as a projection of uniform circular motion on any diameter , equation of SHM, derivation of displacement, velocity and acceleration of a body executing SHM.Free vibrations, Forced vibration, Damped vibrations and Un-damped vibrations with examples. **Simple problems**.

PROPERTIES OF MATTER: Properties of solids: Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve.**Properties of liquids**:

Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its application**Hydrodynamics**: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications.**Surface Tension**: Concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension.**Viscosity**: viscosity and coefficient of viscosity, Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. Simple problems.

SEMICONDUCTOR & MODERN PHYSICS: Semiconductor: Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped). Transistor; description and three terminals, Types- PNP and NPN, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications. Lasers: Principle and Working of Laser, properties of Laser, Types of lasers; Ruby, He-Ne, characteristics and applications. Optical fibre: Introduction, Total internal reflection, critical angel acceptance angle, Structure of optical fiber, Numerical Aperture, applications in communication system (Numerical on critical angel, numerical aperture) Nano-Technology: Definition of Nanoscale, nanometer & nano particle application of Nano-Technology-electronics, automobiles, medical, textile, cosmetics, environmental, spaces and defence, advantages and dis-advantages of nano-Technology. Nonconventional source of energy :Introduction – Non Renewable and renewable (Alternate), energy sources, Examples – Solar Energy, Wind Energy, Tidal Energy, Geo-Thermal Energy and Bio-Mass, Advantages and disadvantages of renewable energy.

E. TEXT BOOKS

- T1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
- T2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
- T3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi

F. REFERENCE BOOKS

- R1. Applied Physics, Vol. Vol. II and TTTI Publications, Tata McGraw Hill, Delhi, I
- R2. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
- R3. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
- R4. A Textbook of Optics, N Subramanyam, BrijLal, MN Avahanulu, S Chand and Company Ltd.

- R5. Introduction to Fiber Optics, AjoyGhatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
- R6. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.
- R7. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.
- R8. E-books/e-tools/ learning physics software/websites etc.
- R9. Principle of physics for class XI and XII by V.K.Mehata and Rohit Mehta, as per Karnataka state PUC syllabus S.Chand and Company, New Delhi
- R10. Principle of physics by P.V.NaikPHI Learning Pvt. Ltd. New Delhi

AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020 **G.** Course Articulation Matrix: (Mapping of COs with POs) CO STATEMENT **CORRELATION WITH CORRELATION WITH PROGRAM PROGRAM OUTCOMES SPECIFIC OUTCOMES** PSO 1 PSO 2 PO 2 3 5 7 9 10 1 4 6 8 [CO1] Represent physical quantities as scalar and vectors and 3 2 solve real life relevant problems. Define scientific work, energy and power and their units. [CO2] 2 Drive relationships for work, energy and power and solve related problems. Compare and relate physical properties associated with 2 3 [CO3] linear motion and rotational motion and apply conservation of angular momentum principle to known problems. [CO4] Explain the phenomenon of surface tension, viscosity, 2 fluid motion & Hooke's law, which helps to illustrate the properties of matter. Apply the basic knowledge of semiconductors to illustrate **2** 3 [CO5] the functioning of simple electronic devices & Nano technology.

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Applied Chemistry Code:DIP11145

Credits- 4 | Semester I

A. Introduction:

- There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life.
- The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians.

B. Course Outcomes: At the end of the course, students will be able

- **[CO1]** Understand the classification and general properties of engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.
- **[CO2]** Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.
- **[CO3]** Qualitatively analyze the engineering materials and understand their properties and applications.
- **[CO4]** Choose fuel and lubricants suitable for economical industrial processing to obtain ecofriendly finished products
- **[CO5]** Ascertain construction, mechanism efficiency of electrochemical cells, solar cell fuel cells. Understand corrosion and develop economical prevention techniques.

Criteria		Description	Maximum Marks							
Continuous	Internal	Internal Examination	20							
Assessment (CIA)		Attendance	5							
		Assignment	5							
End	Semester	End Semester Examination	70							
Examination(ESE)										
Total			100							
Attendance		A minimum of 75% Attendance	is required to be maintained by a							
		student to be qualified for taking	up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medica								
		leaves.								

C. Assessment Plan:

D. SYLLABUS

ATOMIC STRUCTURE, CHEMICAL BONDING AND SOLUTIONS: Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principleQuantum numbers – orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configurationConcept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H2,

F2, HF hybridization in BeCl2, BF3, CH4, NH3, H2O) Coordination bond in NH4+, and anomalous properties of NH3, H2O due to hydrogen bonding, and metallic bonding.

WATER:Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.Cause of poor lathering of soap in hard water, problems caused by the use of hard water Iboiler (scale and sludge, foaming and priming, corrosion etc) Quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation. Municipal water treatment BOD &CODEnlist Indian standard specification of drinking water (collect data and understand standards)

ENGINEERING MATERIALS: Natural occurrence of metals – minerals, ores of iron, aluminum and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy.Extraction of - iron from hematite ore using blast furnace, aluminumfrom bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.Port land cement and hardening, Glasses Refractory and Composite materials.Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (usingPVC, PS, PTFE, nylon – 6, nylon – 66, Bakelite only), rubber and vulcanization of rubber

CHEMISTRY OF FUELS AND LUBRICANTS: Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV)Proximate analysis of coal solid fuel petrol and diesel - fuel rating (octane and cetane numbers),Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism –, physical properties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants

ELECTRO CHEMISTRY: Electronic concept of oxidation, reduction and redox reactions.Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.Industrial Application of Electrolysis – Electrometallurgy Application of Redox reactions in electrochemical cells –Primary cells – dry cell,Secondary cell - commercially used lead storage battery, fuel and Solar cells.Introduction to Corrosion of metals – definition, types of corrosion (chemical and electrochemical), H₂ liberation andO₂ absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.Internal corrosion preventive measures – Purification, alloying and heat treatment and external corrosion preventive measures: metal (anodic, cathodic) coatings.

E. TEXT BOOKS

- T1. Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
- T2. Agarwal, &Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
- T3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.
- T4. Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2015.

F. REFERENCE BOOKS

- R1. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
- R2. Dara, S. S. &Dr.S.S. Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Delhi, 2015.
- R3. Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.
- R4. Dr. G. H. Hugar& Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II NITTTR, Chandigarh, Publications, 2013-14.

AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020 **G.** Course Articulation Matrix: (Mapping of COs with POs) CO **STATEMENT CORRELATION WITH CORRELATION WITH PROGRAM PROGRAM OUTCOMES SPECIFIC OUTCOMES** PSO 1 PSO 2 PO 2 3 4 5 7 8 9 10 1 6 [CO1] Understand the classification and general properties of 2 1 engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding. Understand and assess the suitability of water source for 2 [CO2] 1 domestic and industrial application, effluents and minimize water pollution. Qualitatively analyze the engineering materials and [CO3] 1 1 1 understand their properties and applications Choose fuel and lubricants suitable for economical [CO4] 2 1 1 industrial processing to obtain eco-friendly finished products [CO5] Ascertain construction, mechanism efficiency of 2 1 electrochemical cells, solar cell fuel cells. Understand corrosion and develop economical prevention techniques.

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

ENGINEERING WORKSHOP PRACTICE

Code: DIP11151 Credits 2 | Semester I

A. Introduction:

- To understand basic engineering processes for manufacturing and assembly
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for specified dimension.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines

[CO2] Understand job drawing and complete jobs as per specifications in allotted time

[CO3] Inspect the job for the desired dimensions and shape

[CO4] Operate, control different machines and equipment's adopting safety practices

Criteria	Description	Maximum Marks						
Continuous Internal	Internal Examination	5						
Assessment (CIA)	Attendance	5						
	Assignment	5						
End Semester	End Semester Examination	35						
Examination(ESE)								
Total		50						
Attendance	A minimum of 75% Attendance	e is required to be maintained by						
	a student to be qualified for taki	ing up the End Semester						
	examination. The allowance of 25% includes all types of leaves							
	including medical leaves.							

C. Assessment Plan:

D. SYLLABUS

FITTING SHOP: Introduction Of Workshop Tools & Measuring InstrumentFitting: - Demonstration of different fitting tools, safety practice and general guidelines. Cutting and Filing. Filing, Measurement and Finishing etc Practice: T-fitting, V-Fitting etc

CARPENTRY SHOP: Demonstration of power tools and equipment for carpentry, safety practices and general guidelines. Carpentry: Demonstration of different wood working tools / machines. Demonstration of Different Wood Working Processes Like Plaining Marking ,Chiseling ,Grooving ,Turning of Wood etc Practice: - T-Lap joint, Dovetail joint etc

WELDING SHOP: Demonstration of tools and equipment for welding, safety practices and general guidelines. Demonstration of different welding tools / machines. Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding Practice : Butt , lap joint etc.

PLUMBING SHOP: Demonstration – plumbing tools, symbols and joints. Joining GI pipes by threading, PVC pipes by gluing and cementingPractice :- To Make Internal & External Thread

MACHINE SHOP: Demonstration of tools and equipment for Machine, safety practices and general guidelines. Demonstration of all machine like Lathe Machine, Drill machine, Milling Machine, Shaper machine etc. Practice :- To make Step Turning , Tapper Turning, Turning, Facing etc.

E. TEXT BOOKS

T1. Workshop Technology Vol-I,II,IIIHajraChoudry., Media Promotors and Publishers P Ltd.

T2.Manufacturing Technology vol 1 by P.N. RaoMc.Grow Hill.

F. REFERENCE BOOKS

R1. Workshop technology by R.S. Raghuwanshi.Dhanpat Ray & co

R2. Workshop technology by R.S. Khurmi&J.K.GuptaS.Chand co.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	CORRELATION WITH PROGRAM OUTCOMES						CORRE ON PROGR SPECIF OUTCO	CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines	2								2			
[CO2]	Understand job drawing and complete jobs as per specifications in allotted time						2			2			
[CO3]	Inspect the job for the desired dimensions and shape		2										
[CO4]	Operate, control different machines and equipment's adopting safety practices			2									

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation
Subject: Applied Physics Lab Code: DIP11148

Credits-1 | Semester I

A. Introduction:

- To give an understanding of physical world by observations and measurements.
- Use of physical principles and analysis in various fields of engineering and technology is very prominence.
- To supplement the factual knowledge gained in the lecture with hands-on experience with the apparatus & developing skills in taking measurements.
- To develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems.
- B. Course Outcomes: At the end of the course, students will be able

[CO1] Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge,

Spherometer) for determining dimensions of physical quantities and make measurements with accuracy and precision.

[CO2] Apply and verify laws of forces and determine resultant force acting on a body.

[CO3] Determine the velocity of sound in air.

[CO4] Understand the fall of a sphere through a viscous liquid

[CO5] Understand gravitational force & calculate the time of a pendulum.

Criteria	Description	Maximum Marks							
Continuous Internal	Internal Examination	5							
Assessment (CIA)	Attendance	5							
	Assignment	5							
End Semester	End Semester Examination	35							
Examination(ESE)									
Total		50							
Attendance	A minimum of 75% Attendance	e is required to be maintained by							
	a student to be qualified for taking up the End Semester								
	examination. The allowance of 25% includes all types of leaves								
	including medical leaves.								

C. Assessment Plan:

D. SYLLABUS

S.No	Name of Experiments
1.	To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier caliper and find volume of each object.
2.	To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3.	To determine radius of curvature of a convex and a concave mirror surface using a spherometer.
4.	To verify experimentally the law of parallelogram of forces.

5.	To verify experimentally the law of converse of triangle of forces.
6.	To determine force constant of a spring using Hook's Law
7.	To find the viscosity of a given liquid (Glycerin) by Stoke's law.
8.	To verify experimentally the Lami's theorems.
9.	To determine the velocity of sound in air at room temperature and at 0 C by using Resonance Air Column method.
10	To determine force constant of a spring using Hook's Law.
11	To find the Moment of Inertia of a flywheel about its axis of rotation
12	To find the time period of a simple pendulum for small amplitudes and draw the graph of
	length of the pendulum against square of the time period. Use the graph to find the length of
	the simple pendulum.

E. TEXT BOOKS

- T1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
- T2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi

F. REFERENCE BOOKS

- R1. Practical Physics by C. L. Arora, S. Chand & Company Ltd.
- R2. e-books/e-tools/ learning physics software/you Tube videos/ websites etc.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH							CORRELATION WITH PROGRAM						
		PRO	PROGRAM OUTCOMES						SPECIFIC OUTCOMES						
		РО	PO	PO	PO	PO	PO	РО	PO	PO	PO	PSO 1	PSO 2		
		1	2	3	4	5	6	7	8	9	10				
[CO1]	Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, Spherometer) for determining dimensions of physical quantities and make measurements with accuracy and precision.				2										
[CO2]	Apply and verify laws of forces and determine resultant force acting on a body.			2	1										
[CO3]	Determine the velocity of sound in air.		2	1											
[CO4]	Understand the fall of a sphere through a viscous liquid						1								
[CO5]	Understand gravitational force & calculate the time of a pendulum.	2		1											

Subject: Applied Chemistry Laboratory Code: DIP11146 Credits-1 | Semester I

A. Introduction:

- There are numerous number of materials used in fabricating and manufacturing devices • for the comfort of life.
- The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus.
- This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

B. Course Outcomes: At the end of the course, students will be able

[CO1] To express quantitative measurements accurately.

[CO2] To practice and adapt good measuring techniques.

[CO3] To use various apparatus for precise measurements.

[CO4] To understand and differentiate different methods of quantitative analysis.

[CO5] To know and understand principles of quantitative analysis using instruments.

C. Assessment Plan:								
Criteria	Description	Maximum Marks						
Continuous Internal	Internal Examination	5						
Assessment (CIA)	Attendance	5						
	Assignment	5						
End Semester	End Semester Examination	35						
Examination(ESE)								
Total		50						
Attendance	A minimum of 75% Attendan	A minimum of 75% Attendance is required to be maintained by						
	a student to be qualified for ta	a student to be qualified for taking up the End Semester						
	examination. The allowance of	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.							

D. SYLLABUS

S.No	Name of Experiments
1	Preparation of standard solution of oxalic acid or potassium permanganate.
	To determine strength of given sodium hydroxide solution by titrating against standard
2	oxalic acid solution using phenolphthalein indicator.
	Standardization of KMnO4 solution using standard oxalic acid and Determine the
3	percentage of iron present in given Hematite ore by KMnO4 solution.
4	Alkalinity of given water sample using 0.01M sulphuric acid

	To determine the viscosity and relative viscosity of given sample by using Ostwald's
5	Viscometer.
	Volumetric estimation of total hardness of given water sample using standard EDTA
6	solution.
	Proximate analysis of coal
7	a) Gravimetric estimation moisture in given coal sample
8	Determine the conductivity of given water sample.
9	Determination of the Iron content in given cement sample using colorimeter.
10	Determination of calorific value of solid or liquid fuel using bomb calorimeter.
11	Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
12	Determination of viscosity of lubricating oil using Redwood viscometer.

D. TEXT BOOKS

- T1.Dr. G. H. Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. Vol. II and NITTTR, Chandigarh, Publications, 2013-14, I
- T2. Practical Chemistry by S.S. Dara

E. REFERENCE BOOKS

R1. Practical Chemistry by D N Bajpai – S. Chand Publishing

R2. Advanced Practical Chemistry Book by pragatiprakashan

	AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020														
G. Course Articulation Matrix: (Mapping of COs with POs)															
СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES							CORRELATION WITH PROGRAM SPECIFIC OUTCOMES						
		РО	РО	РО	PO	РО	PO	PO	PO	PO	РО	PSO 1	PSO 2		
		1	2	3	4	5	6	7	8	9	10				
[CO1]	To express quantitative measurements accurately.	1		1											
[CO2]	To practice and adapt good measuring techniques.		1		1							1			
[CO3]	To use various apparatus for precise measurements.			1									2		
[CO4]	To understand and differentiate different methods of quantitative analysis.					1	1								
[CO5]	To know and understand principles of quantitative analysis using instruments.														

Subject: COMMUNICATION SKILLS IN ENGLISH LAB Code: DIP11150 Credits- 1 | Semester I

A. Introduction:

- To develop listening skills for enhancing communication.
- To develop speaking skills with a focus on correct pronunciation and fluency.
- To introduce the need for Personality development- Focus will be on developing certain qualities, which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

B. Course Outcomes: At the end of the course, students will be able

[CO1] They will also demonstrate a significant increase in word power

- **[CO2]** The variety of exercises and activities that will be conducted in the Language Lab will developtheir skills needed to participate in a conversation like listening carefully and respectfully to others' viewpoints; articulating their own ideas and questions clearly and over all students will be able to prepare, organize, and deliver an engaging oral presentation
- [CO3] They will also develop non-verbal communication such as proper use of body language and gestures
- [CO4] Managing personal and professional is life.

[CO5] Enhancing personality development

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	5						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	35						
Examination(ESE)									
Total			50						
Attendance		A minimum of 75% Attendance is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medica							
		leaves.							

C. Assessment Plan:

D. SYLLABUS

LISTENING SKILLS: Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

INTRODUCTION TO PHONETICS: Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

SPEAKING SKILLS: Standard and formal speech: Group discussion, oral presentations, public speaking, business presentationsetc. Conversation practice and role-playing, mock interviews etc.

BUILDING VOCABULARY: Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

E. TEXT BOOKS

T1. Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press, 1956.

T2. James Hartman& et al. Ed. English Pronouncing Dictionary. Cambridge: Cambridge University35 First Year Curriculum Structure Common to All Branches Press, 2006.

T3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)

T4. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.

F. REFERENCE BOOKS

- R1. Lindley Murray. An English Grammar: Comprehending Principles and Rules. London: Wilsonand Sons, 1908.
- R2. Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.
- R3. J.Sethi& et al. A Practice Course in English Pronunciation. New Delhi: Prentice Hall, 2004.
- R4. Pfeiffer, William Sanborn and T.V.S Padmaja. Technical Communication: A Practical Approach.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH						CORRELATION WITH PROGRAM						
		PROGRAM OUTCOMES						SPECIFIC OUTCOMES						
		PO PO PO PO PO P					РО	РО	PO	РО	PSO 1	PSO 2		
		1	2	3	4	5	6	7	8	9	10			
										-				
[CO1]	They will also demonstrate a significant increase in word power			2						2				
[CO2]	exercises and activities that will be conducted in the Language	2							2					
[CO3]	develop non-verbal communication				2					2				
[CO4]	Managing personal and professionals life						2	2						
[CO5]	Enhancing personality development						2				2			



Syllabus of Diploma in Civil Engineering Semester-II

ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	4 100		70 20		5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(**Group-B**)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47 .5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20	5	5
2	Advanced Surveying	PCC	3	3	100 70		20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5
	Elective-II								
	Traffic Engineering								
3	Solid Waste Management	PEC	3	3	100	70	20	5	5
	Advanced Construction Technology								
	Elective-III Pavement Design & maintenance								
4	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5
	Building Services and Maintenance								
5	Open Elective-I Engineering Economics & Accountancy Renewable Energy Technologies	OEC	3	3	100	70	20	5	5
	Numerical Methods								
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5
	Practical								
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0
	TOTAL		24	24	900	630	190	40	40

Project to be carried over to next semester

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Public Health Engineering	HSMC	3	3	100	70	20	5	5
	Elective-IV								
	Repairs and Maintenance of Structures								
2	Advanced Design of Structures	PEC	3	3	100	70	20	5	5
	Tendering and Accounts								
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5
	Open Elective-II								
	Project Management								
4	Disaster Management	OEC	3	3	100	70	20	5	5
	Operations Research								
	Open Elective-III								
	Sustainable Development	OEC							
5	Artificial Intelligence		3	3	100	70	20	5	5
	History of Science and Engineering								
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5
7	Seminar	PROJ	1	2	50	35	5	5	5
8	Major Project-II	PROJ	3	0	100	100	0	0	0
	TOTAL		21	20	700	520	110	35	35

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	19
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	50
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	7	16
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
	Total	59	132

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card.

The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

Subject: Mathematics- II

Code: DIP12008

4 Credits | Semester II

A. Introduction:

- To study the functions and this course enables the students to understand the calculus in engineering problems.
- To learn solve system of linear equation by using matrix and determinants.
- To gain profiency in calculus computations.
- for analyzing and describing the behavior of functions limits derivatives and integrals

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Remembering several areas of mathematics beyond calculus

[CO2] Understand to solve differential equations using appropriate methods.

[CO3] Analyzing the Concepts of differentiation in physics & engineering courses

[CO4] Evaluating the ODE of first degree, first order in engineering field

[CO5] Creating interest in mathematics

Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		tudent to be qualified for taking up the End Semester examination						
		The allowance of 25% includes all types of leaves including r						
		leaves.						

C. Assessment Plan:

D. SYLLABUS

MATRICES AND DETERMINANTS: Matrices: Basic concepts of matrices: Definition, types of matrices and mathematical operations on matrices (addition, subtraction and multiplication of matrices).**Determinant:** Definition, problems on finding the determinant value of 2nd and 3rd order. Problems on finding unknown quantity in a 2nd and 3rd order determinants using expansion. Solving simultaneous linear equations using matrix method (Cramer's rule up to 3rd order).Inverse and applications of matrices: Minors and Cofactors of elements of matrix. Adjoin and Inverse of matrices of order 2ndand 3rd order. Elementary row and column operations on matrices. Characteristic equation and characteristic roots (Eigen values) of 2x2 matrix. Statement of Cayley-Hamilton theorem and its verification for 2x2 matrixes.

DIFFERENTIAL CALCULUS: Constants and variables. Definition of function. Types of functions: Explicit and implicit function, odd and even functions-2. Concept of $x \rightarrow a$.Definition of limit of a function. Indeterminate forms. Evaluation of limit of functions by factorization, rationalization. Algebraic limitStatement of $\lim_{x\to a} \frac{x^n - a^n}{x - a} = na^{n-1}$ where n is any rational number. Proof of $\lim_{\theta\to 0} \frac{\sin \theta}{\theta} = 1$ where θ is in radian. Related problems.Derivatives of functions of x^n , sin x, cos x&tan xwith respect to 'x' from first principle method Rules of differentiation: Sum, product, quotient rule & problems on rules.Derivatives of function of a function (Chain rule) & problems. Inverse trigonometric functions & their derivatives. Implicit functions, Parametric functions & problems, differentiation of exponential and Logarithmic, second order differentiation.

APPLICATION OF DIFFERENTIATION: Geometrical meaning of derivative. Derivative as slope. Equations of tangent & normal to the curve y = f(x) at a given point- (statement only) Derivative as a rate measure i.e.to find the rate of change of displacement, velocity, radius, area, volume-using differentiationDefinition of increasing & decreasing functionMaxima& minima of a function

INTEGRAL CALCULUS, DEFINITE INTEGRAL & ITS APPLICATIONS: Definition of Integration. List of standard integrals. Rules of integration (only statement)problems.-1, Integration by substitution method. Problems. Standard integrals. Integration by parts definite integration & problemsArea, volume, centers of gravity & moment of inertia by integration method. Simple problems

DIFFERENTIAL EQUATION: Definition, example, order & degree of differential equation with examples Formation of differential equation by eliminating arbitrary constants up to second order.Solution of O. D. E of first degree & first order by variable separable method Linear differential equations & its solution using integrating factor.

E. TEXT BOOKS

F. REFERENCE BOOKS

- R1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
- R2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1999.
- R3. NCERT Mathematics Text books of class XI and XII.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COR ATIC WIT PRO	RREL CORRELATION WITH PROGRAM ION OUTCOMES ITH OGRA							I SP	SPECIFIC				
		M OUTCO MES		M OUTCO MES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2		
[CO1]	Remembering several areas of mathematics beyond calculus	1			1										
[CO2]	Understand to solve differential equations using appropriate methods		1			1									
[CO3]	Analyzing the Concepts of differentiation in physics & engineering courses	1		1											
[CO4]	Evaluating the ODE of first degree, first order in engineering field	1				1									
[CO5]	Creating interest in mathematics					1					1				

Subject: Fundamentals of Electrical and Electronics Engineering

Code:

4 Credits |Semester II

A. Introduction:

- To provide basic knowledge of the different elements and concepts of electrical engineering field.
- To learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.
- To impart knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- To provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
- To highlight the importance of transformers in transmission and distribution of electric power.

B. Course Outcomes: At the end of the course,

[CO1] Remembering the basic terminology/definitions of electrical component & Signals

- [CO2] Understanding the Analog electronic Specially Op-Amp & Digital Electronics and their applications
- **[CO3]** Applying the knowledge of theorems/laws for Predict the behavior of any electrical and magnetic circuits and Use the principles of electromagnetic induction in electrical applications
- [CO4] Analyzing the formulation and solution of simple and complex AC, Dc circuits
- **[CO5]** Evaluating the requirement of transformers and the type of electrical machine used for that particular application
- C. Assessment Plan:

Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		student to be qualified for taking up the End Semester examinat						
		The allowance of 25% includes all	l types of leaves including medical					
		leaves.						

D. SYLLABUS

OVERVIEW OF ELECTRONIC COMPONENTS & SIGNALS: Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS andCMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average,Rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources Independent/dependent voltage current sources. Overview of electrical & electronics engineering field

OVERVIEW OF ANALOG CIRCUITS AND DIGITAL ELECTRONICS: Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator. Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

ELECTRIC AND MAGNETIC CIRCUITS: EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve;Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equationsof self and mutual inductanceAnalogy between electric and magnetic circuits.

A.C. CIRCUITS: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and currentVoltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.

TRANSFORMER AND MACHINES: Classification: Static & dynamic (rotary) machines, examples. Transformer: Definition, study of principle of operation of transformer, derivation of EMF equation, turns ratio, voltage transformation ratio, step-up & step-down transformers, losses, efficiency, regulation, & simple problems Classification Transformers: Based on cores, frequency, power and application, & their features DC machines: Principle of operation & features of DC motors & generators AC machines:Features of AC motors & alternators

E. TEXT BOOKS

- T1. Basic Electrical Engineering, V. K. Mehta and Rohit Mehta, S. Chand and Company Publishers, RE 2012, ISBN 81219087
- T2. Theraja, B. L., Electrical Technology Vol I, S. Chand Publications, New Delhi, 2015, ISBN:9788121924405

- T3. Theraja, B. L., Electrical Technology Vol II, S. Chand Publications, New Delhi, 2015, ISBN:9788121924375
- T4. Electronic Components, Dr. K. Padmanabhan and P. Swaminathan, Lakshmi Publications, 2006.

F. REFERENCE BOOKS

- R1. Fundamentals Of Electric Circuits, 5Th Edn Edition-5, <u>Charles K. Alexander And Matthew</u> <u>N.O. Sadiku</u>, Publisher McGraw Hill India.
- R2. Circuit Theory Analysis and Synthesis Paperback 2018 by <u>AbhijitChakrabarti</u> (Author), publisher DhanpatRai and Co.
- R3. Electronics: Fundamentals and Applications by D. Chattopadhyay and P. C. Rakshit, publication new age international publishers.
- R4. RituSahdev, Basic Electrical Engineering, Khanna Publishing House
- R5. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN :978-0-07-0088572-5
- R6. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latesteditionISBN : 9781107464353

	AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020												
C	. Course Articulation Matrix: (Mapping of COs with POs)												
СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES CORRELATION N WI PROGRAM SPECIFIC OUTCOMES OUTCOMES								ELATIO WITH RAM FIC DMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Remembering the basic terminology/definitions of electrical component & Signals	2	1										
[CO2]	Understanding the Analog electronic Specially Op-Amp & Digital Electronics and their applications			2	3								
[CO3]	Applying the knowledge of theorems/laws for Predict the behavior of any electrical and magnetic circuitsand Use the principles of electromagnetic induction in electrical applications					2		2					
[CO4]	Analyzing the formulation and solution of simple and complex AC, Dc circuits						2		1				
[CO5]	Evaluating the requirement of transformers and the type of electrical machine used for that particular application									1	2		

Subject: Introduction to IT Systems

Code: DIP12157

Credits - 3 | Semester II

A. Introduction:

• This course is intended to make new students understand computing environment -Learning basic computer skills, learning basic application software tools, understanding computer hardware, cyber security awareness

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Comfortably work on computer, install and configure OS

[CO2] Assemble a PC

[CO3] Connect it to external devices, write documents,

[CO4] Create worksheets, prepare presentations

[CO5] Protect information and computers from basic abuses/ attacks.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. Assessment Plan:

D. SYLLABUS

INTRODUCTION: Computer, Functional part of computers, history and evolution of computersBasic internet skills: understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals), college portals Hardware and software, Advantages and disadvantages of computers.Memory: primary memory (RAM and ROM) and secondary memory, HDD and other peripheral devices

INTRODUCTION TO OPERATING SYSTEM: My computer, recycle bin, status bar, Start and Menu Selection, Creating and rename of files and folders, Copy, paste, moving files, opening and closing of different windows.Introduction to DOS, DOS commands, OS Installation (Linux and MS Windows)Unix Shell and Commands, vi editor.

INTRODUCTION TO OFFICE TOOLS: Open Office writer, Open Office spreadsheet, Open Office Impressworking with MS-Word-inserting text, word art, table, images, adding

background **Powerpoint:-** Difference between presentation and documents, Title, Text Creation: Fonts and size, Bullets ,moving to next slides, Presentation of slides: Selection of types of slides, slide show and presentation

INTRODUCTION TO INTERNET: Introduction to Internet, WWW and Web Browsers: Basic of Computer networks; LAN, WAN; Applications of Internet; World Wide Web; Web Browsing software, Search Engines; Understanding URL; Domain name; IP Address; Using egovernance websiteHTML4, CSS, making personal webpages

INFORMATION SECURITY BEST PRACTICES: Information security, Hacking, cryptography and its applications

E. TEXT BOOKS

- T1. Online Resources, Linux man pages, Wikipedia
- T2. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

F. REFERENCE BOOKS

- R1. R. S. Salaria, Computer fundamentals, Khanna publication house
- R2. Computer Fundamentals Concepts, Systems, Application, D.P.Nagapal, S.Chand Publication
- R3. Ramesh Bangia, PC Software Made Easy The PC Course Kit, Khanna Publishing House

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES						CORRELATIO N WITH PROGRAM SPECIFIC OUTCOMES					
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Comfortably work on computer, install and configure OS	1			3								
[CO2]	Assemble a PC			2									
[CO3]	Connect it to external devices, write documents,										2		
[CO4]	Create worksheets, prepare presentations									1			
[CO5]	Protect information and computers from basic abuses/ attacks.						1						

Subject: Engineering Mechanics

Code: DIP12153

Credits- 3 | Semester II

A. Introduction:

- To obtain resultant of various forces
- To obtain resultant of various forces
- To understand role of friction in equilibrium problems
- To know fundamental laws of machines and their applications to various engineering problems

B. Course Outcomes: At the end of the course, students will be able

[CO1] Identify the force systems for given conditions by applying the basics of mechanics.

[CO2] Determine unknown force(s) of different engineering systems.

[CO3] Apply the principles of friction in various conditions for useful purposes.

[CO4] Find the centroid and centre of gravity of various components in engineering systems.

[CO5]Select the relevant simple lifting machine(s) for given purposes.

Criteria		Description	Maximum Marks			
Continuous	Internal	Internal Examination	20			
Assessment (CIA)		Attendance	5			
		Assignment	5			
End	Semester	End Semester Examination	70			
Examination(ESE)						
Total			100			
Attendance		A minimum of 75% Attendance is required to be maintained by a				
		student to be qualified for taking up the End Semester examination.				
		The allowance of 25% includes all types of leaves including medical				
		leaves.				

C. Assessment Plan:

D. SYLLABUS

BASICS OF MECHANICS AND FORCE SYSTEM: Basic concepts, applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

EQUILIBRIUM: Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods of analyzing equilibrium, Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, hinged, roller

and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang subjected to combination of Point load and uniformly distributed load, Beam reaction graphically for simply supported beam subjected to vertical point loads only

FRICTION & VIRTUAL WORK: Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Introduction, laws of coulomb friction, simple contact friction problems, belt friction, the square crew thread rolling resistance, Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only. Work of a force, Principle of Virtual work and its application.

CENTROID AND CENTRE OF GRAVITY& TRUSS: Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle), Centroid of composite figures composed of not more than three geometrical figures, Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids. The structural model, simple trusses, analysis of simple trusses: method of joints, Method of sections, graphical method.

SIMPLE LIFTING MACHINE: Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility, Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

E. TEXT BOOKS

T1.D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008) T2.Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.

T3.Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.

T4.Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.

T5.Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.

F. REFERENCE BOOKS

R1. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, CambridgeUniversity Press.

R2. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020 **G.** Course Articulation Matrix: (Mapping of COs with POs) CO **STATEMENT** CORRELATION WITH PROGRAM OUTCOMES CORRELATIO Ν WITH PROGRAM SPECIFIC OUTCOMES PO PO PSO 1 PSO 2 PO PO PO PO PO PO PO PO 5 2 3 4 6 7 8 9 1 10 Identify the force systems for given conditions by [CO1] 3 3 3 2 applying the basics of mechanics. Determine unknown force(s) of different engineering [CO2] 3 3 3 systems. [CO3] Apply the principles of friction in various conditions for 3 3 1 useful purposes. [CO4] Find the centroid and centre of gravity of various 3 3 2 components in engineering systems. [CO5] Select the relevant simple lifting machine(s) for given 3 3 purposes.

Subject: Environmental Sciences

Code: DIP12155

0 Credits | Semester II

A. Introduction:

- Solve various engineering problems applying ecosystem to produce eco friendly products.
- Use relevant air and noise control method to solve domestic and industrial problems.
- Use relevant water and soil control method to solve domestic and industrial problems.
- To recognize relevant energy sources required for domestic and industrial applications.
- Solve local solid and e-waste problems.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the ecosystem and terminology and solve various engineering problems applying

[CO2] Ecosystem knowledge to produce eco – friendly products.

[CO3] Understand the suitable air, extent of noise pollution, and control measures and acts.

[CO4] Understand the water and soil pollution, and control measures and acts.

[CO5] Understand different renewable energy resources and efficient process of harvesting.

C. Assessment Plan:						
Criteria	Description	Maximum Marks				
Continuous Inter	nal Internal Examination	10				
Assessment (CIA)	Attendance	2.5				
	Assignment	2.5				
End Semes	ter End Semester Examination	35				
Examination(ESE)						
Total		50				
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination.					
	The allowance of 25% includes all types of leaves including medical					
	leaves.					

D. SYLLABUS

ECOSYSTEM: Structure of ecosystem, Biotic & Abiotic components, Food chain and food web Aquatic (Lentic and Lotic) and terrestrial ecosystem Carbon, Nitrogen, Sulphur, Phosphorus cycle.Global warming -Causes, effects, process, Green House Effect, Ozone depletion

AIR AND NOISE POLLUTION: Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler)Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler

Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

WATER AND SOIL POLLUTION: Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis). Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

RENEWABLE SOURCES OF ENERGY: Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills. Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy. New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin andpower plants of geothermal energy.

SOLID WASTE MANAGEMENT, ISO 14000 & ENVIRONMENTAL MANAGEMENT:

Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste Air quality act 2004, air pollution control act 1981, water pollution, and control act1996. Structure and role of Central and state pollution control board. Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industryISO14000: Implementation in industries, Benefits.

E. TEXT BOOKS

- T1. Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.
- T2. Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)

F. REFERENCE BOOKS

R1. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, NewDelhi
R2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
First Year Curriculum Structure Common to All Branches 52
R3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and

- R4. Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099-
- R5. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
- R6. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi
- R7. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
- R8. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07-451871-8.
- R9. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.
- R10. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.
- R11. Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6
G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES						CORRELATIO N WITH PROGRAM SPECIFIC OUTCOMES					
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the ecosystem and terminology and solve various engineering problems applying						3						
[CO2]	Ecosystem knowledge to produce eco – friendly products.					2	2						
[CO3]	Understand the suitable air, extent of noise pollution, and control measures and acts.						2						
[CO4]	Understand the water and soil pollution, and control measures and acts.						2						
[CO5]	Understand different renewable energy resources and efficient process of harvesting.										2		

Subject: Engineering Graphics Code: DIP12152

Credits 2 | Semester II

A. Introduction:

- To understand the language of graphics, which is used to express ideas, convey instructions while carrying out engineering jobs.
- To develop drafting and sketching skills, to know the applications of drawing equipment and get familiarize with Indian Standards related to engineering drawings.
- To develop skills to visualize actual object or a part of it based on drawings.
- To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the language of graphics and familiarize with Indian Standards related to engineering drawings

[CO2] Develop drafting and sketching skills, application of drawing equipment's.

[CO3] Read various engineering curves, projections and dimensioning styles.

[CO4] Develop skills to translate ideas into sketches and draw.

[CO5] Develop skills to visualize actual object or a part of it, based on drawings.

Criteria		Description	Maximum Marks						
Continuous Internal		Internal Examination	5						
Assessment (CIA)									
		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	35						
Examination(ESE)									
Total			50						
Attendance		A minimum of 75% Attendance is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medical							
		leaves.							

C. Assessment Plan:

D. SYLLABUS

BASIC ELEMENTS OF DRAWING: Drawing Instruments and supporting materials, Convention of lines and their applications. Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale. Geometrical and Tangency constructions.

ORTHOGRAPHIC PROJECTIONS OF POINTS AND LINES: Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. Projections of points Projections of lines in different quadrants, inclinations, True lengths of the lines projections on auxiliary planes

PROJECTIONS OF PLANE FIGURES: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes).

PROJECTION OF SOLIDS: Types of Solid. Projection of Cone, Cylinder, Prism & pyramids. Simple cases when solid are placed in different positions Axis faces and tines lying in the faces of the solid making given angles.

ISOMETRIC PROJECTION: Introduction to isometric projections. Isometric scale and Natural scale. Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only

E. TEXT BOOKS

T1. Engineering Graphics, Agrawal B. & Agrawal C. M, TMH Publication

T2. Textbook on Engineering Drawing, Narayana, K.L. & P Kannaiah, Scitech Publishers

F. REFERENCE BOOKS

R1. Engineering Graphics, N.D Bhatt, Charotar Publishing House Pvt. Limited

R2. Principle of Engineering Graphics and Drawing, R.K Dhawan, S. Chand Publishing

R3. Engineering Graphics and Drafting, P.S GILL, S. K. Kataria& Sons

R4. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C. PearsonEducation

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES					CORRE N PROGE SPECIE OUTCO	LATIO WITH AAM IC DMES					
		PO 1	PO 2	PO 3	PO 4	PO 5	РО 6	PO 7	PO 8	РО 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the language of graphics and familiarize with Indian Standards related to engineering drawings	2	1		1								
[CO2]	Develop drafting and sketching skills, application of drawing equipment's.				1								2
[CO3]	Read various engineering curves, projections and dimensioning styles.												
[CO4]	Develop skills to translate ideas into sketches and draw.	1											
[CO5]	Develop skills to visualize actual object or a part of it, based on drawings.											2	

Subject: Fundamentals of Electrical and Electronics EngineeringLab Code: DIP12156 Credits- 1 | Semester II

A. Introduction:

- To provide basic knowledge of the different elements and concepts of electrical engineering field.
- To learn basic concepts of various active and passive electronic components applications in industrial processes of different fields

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Remembering basic problems related to electrical circuits

[CO2] Understanding operation of different electrical technologies.

[CO3] Analyzing different types of signal waveforms.

[CO4] Evaluating a various electronic circuits.

[CO5] Use relevant electric/electronic protective devices safely.

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	5						
Assessment (CIA)									
		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	35						
Examination(ESE)									
Total			50						
Attendance		A minimum of 75% Attendance is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medica							
		leaves.							

D. SYLLABUS

LIST OF PRACTICALS							
1	Determine the resistance of a given unknown resistor experimentally and compare it with its colour coded value.						
2.	Determine voltage, current and power in R-L series circuit.						
3.	Demonstrate the verification of Ohm's law.						
4	Compute the effective resistance experimentally for the following combinations: Three resistors are connected in (a) series and (b) parallel.						
5	Connect capacitors in series and parallel combination on bread board and						

	measure its value using multimeter.
6.	Demonstrate the verification of Kirchhoff's Current Law (KCL).
7	Demonstrate the verification of Kirchhoff's Voltage Law (KVL).
8	Demonstrate the characteristics of Half Wave Rectifier.
9	Test the PN-junction diodes using digital multimeter and measure the performance of
	PN-junction diode.
10	Demonstrate the characteristics of full Wave Rectifier.
11	Verify experimentally Thevenin's theorem
12	Verify experimentally Norton's theorem

E. TEXT BOOKS

- T1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House, 2018
- T2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
- T3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
- T4. Theraja, B. L., Electrical Technology Vol I, S. Chand publications, New Delhi, 2015, ISBN: 9788121924405

F. REFERENCE BOOKS

- R1. Theraja, B. L., Electrical Technology Vol II, S. Chand publications, New Delhi, 2015, ISBN:9788121924375
- R2. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
- R3. Sedha, R.S., A text book of Applied Electronics, S.Chand ,New Delhi, 2008, ISBN-13: 978-8121927833
- R4. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
- R5. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, NewDelhi 2015 ISBN : 9780195425239

F. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES							CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES				
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Remembering basic problems related to electrical circuits	1		2									
[CO2]	Understanding operation of different electrical technologies.		1		3								
[CO3]	Analyzing different types of signal waveforms.					2							
[CO4]	Evaluating a various electronic circuits.		2										
[CO5]	Use relevant electric/electronic protective devices safely.							2					

Subject: Introduction to IT System Lab

Code:

Credits-1 | Semester II

A. Introduction:

• This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment - basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Comfortably work on computer, install and configure OS
- [CO2] Assemble a PC
- [CO3] Connect it to external devices, write documents,
- [CO4] Create worksheets, prepare presentations
- [CO5] Protect information and computers from basic abuses/ attacks.

C. Assessment Plan:

Criteria		Description	Maximum Marks					
Continuous Internal		Internal Examination	5					
Assessment (CIA)								
		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	35					
Examination(ESE)								
Total			50					
Attendance		A minimum of 75% Attendance is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.						
		The allowance of 25% includes all types of leaves including medica						
		leaves.						

D. SYLLABUS

	LIST OF PRACTICALS						
1	Introduction to various hardware components of a computer.						
2.	Introduction to various e-governance/ Digital India portals, understanding their features						
3.	Installing Linux/DOS and performing commands						
4	HTML program to create a web page						
5	HTML program to create a List of items and table						
6.	HTML program to create a bio data using CSS						

7	Creating a text file using Open Office/ MS-word
8	Creating a text file and adding borders, tables, word art etc
9	Creating a PPt using Open Office/ MS Powerpoint
10	Creating a slide show for the powerpoint presentation

E. TEXT BOOKS

- T1. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education.
- T2. PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

F. REFERENCE BOOKS

R1. Online resources, Linux man pages, Wikipedia.

- R2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
- R3. Ramesh Bangia, PC Software Made Easy The PC Course Kit, Khanna Publishing House.
- R4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATI ON WITH PROGRAM OUTCOMES		ATI ITH M IES	OUTCOMES		ES		ITH			M SP	ECIFIC
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Comfortably work on computer, install and configure OS	1			3								
[CO2]	Assemble a PC			2									
[CO3]	Connect it to external devices, write documents,										2		
[CO4]	Create worksheets, prepare presentations									1			
[CO5]	Protect information and computers from basic abuses/ attacks.						1						

Subject: Engineering Mechanics Lab

Code: DIP12154

Credits- 1 | Semester II

A. Introduction:

- To obtain resultant of various forces.
- To calculate support reactions through conditions of equilibrium for various structures
- To understand role of friction in equilibrium problems
- To know fundamental laws of machines and their applications to various engineering problems

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Identify the force systems for given conditions by applying the basics of mechanics.

[CO2] Determine unknown force(s) of different engineering systems.

[CO3] Apply the principles of friction in various conditions for useful purposes.

[CO4] Find the centroid and center of gravity of various components in engineering systems.

[CO5] Select the relevant simple lifting machine(s) for given purposes..

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	5						
Assessment (CIA)									
		Attendance	5						
		Assignment	5						
End Semester		End Semester Examination	35						
Examination(ESE)									
Total			50						
Attendance		A minimum of 75% Attendance is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medical							
		leaves.							

D. SYLLABUS

	LIST OF PRACTICALS
1.	To study various equipment is relate to Engineering Mechanics.
2.	To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3.	To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4.	Derive Law of machine using Worm and worm wheel.
5.	Derive Law of machine using Single purchase crab.
6.	Derive Law of machine using double purchase crab.
7.	Derive Law of machine using Weston's differential or wormed geared pulley block.
8.	Determine resultant of concurrent force system applying Law of Polygon of forces using

	forcetable.
9.	Determine resultant of concurrent force system graphically.
10.	Determine resultant of parallel force system graphically.
11.	Verify Lami's theorem
12.	Study forces in various members of Jib crane.
13.	Obtain support reactions of beam using graphical method.
14.	Determine coefficient of friction for motion on horizontal and inclined plane.
15.	Determine centroid of geometrical plane figures.
16.	Determine support reactions for simply supported beam.

E. TEXT BOOKS

T1. Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge UniversityPress.

T2. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

F. REFERENCE BOOKS

R1. Bedi D.S., Engineering Mechanics, Khanna Publishing House

R2. Khurmi, R.S., Applied Mechanics, S.Chand& Co. New Delhi.

R3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.

R4. Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.

R5. Dhade, Jamadar&Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF ON PRC OUT	CORRELATI CORF ON WITH OUTC PROGRAM OUTCOMES		OUTCOMES			W	ITH	PRO	OGRA	M SP	ECIFIC
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the force systems for given conditions by applying the basics of mechanics.	1		2									
[CO2]	Determine unknown force(s) of different engineering systems.		1		3								
[CO3]	Apply the principles of friction in various conditions for useful purposes.					2							
[CO4]	Find the centroid and center of gravity of various components in engineering systems.		2										
[CO5]	Select the relevant simple lifting machine(s) for given purposes							2					



Syllabus of Diploma in Civil Engineering Semester-III

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ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(**Group-B**)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47 .5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20	5	5
2	Advanced Surveying	PCC	3	3	100	70	20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5
	Elective-II								
	Traffic Engineering								
3	Solid Waste Management	PEC	3	3	100	70	20	5	5
	Advanced Construction Technology								
	Elective-III Pavement Design & maintenance								
4	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5
	Building Services and Maintenance								
5	Open Elective-I Engineering Economics & Accountancy Renewable Energy	OEC	3	3	100	70	20	5	5
	Technologies Numerical Methods								
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5
	Practical								
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0
	TOTAL		24	24	900	630	190	40	40

Project to be carried over to next semester

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Public Health Engineering	HSMC	3	3	100	70	20	5	5
	Elective-IV								
	Repairs and Maintenance of Structures								
2	Advanced Design of Structures	PEC	3	3	100	70	20	5	5
	Tendering and Accounts								
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5
	Open Elective-II								
	Project Management								
4	Disaster Management	OEC	3	3	100	70	20	5	5
	Operations Research								
	Open Elective-III								
	Sustainable Development	OEC							
5	Artificial Intelligence		3	3	100	70	20	5	5
	History of Science and Engineering								
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5
7	Seminar	PROJ	1	2	50	35	5	5	5
8	Major Project-II	PROJ	3	0	100	100	0	0	0
	TOTAL		21	20	700	520	110	35	35

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	18
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	47
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	6	12
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
1	Total	58	124

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card. The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

Subject: Construction Material Code: DIP13164

3 Credits | Semester III

A. INTRODUCTION:

- To identify different components of building.
- To understand different types of foundation and their significance.
- To know different types of masonry and their construction.
- To highlight the importance of communications in building planning.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- **[C01]** Students will summaries basic knowledge about various kind of materials used in construction work.
- **[CO2]** Students will differentiate about different types of building foundation i.e. shallow and deep foundation, their mechanisms and uses.
- **[CO3]** Summaries knowledge about various structural members of a building like-walls, door, window, stair, flooring, roof etc.
- **[CO4]** Extend to apply their knowledge at the time of decision making for application of structural member including material used.
- [CO5] Identify and use of processed construction materials

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking up the End Semester examination							
		The allowance of 25% includes all types of leaves including medica							
		leaves.							

C. Assessment Plan:

D. SYLLABUS

OVERVIEW OF BUILDING COMPONENTS: Classification of Buildings as per National Building Code Group A to I, As per Types of Constructions-Load Bearing Structure, Framed Structure, Composite Structure. Building Components - Functions of Building Components, Substructure – Foundation, Plinth. Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet

CONSTRUCTION OF SUBSTRUCTURE: Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions.

Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthworkFoundation: Functions of foundation, Types of foundation – Shallow Foundation, SteppedFooting, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation,Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation and Caissons,Pumping Methods of Dewatering, Deep wells, well points, Cofferdams (Introduction only).

CONSTRUCTION OF SUPERSTRUCTURE: Stone Masonry: Terms used in stone masonry- facing, backing, hearting, through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction**Brick masonry:** Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.**Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork

BUILDING COMMUNICATION AND VENTILATION: Horizontal Communication: Doors - Components of Doors, Full Paneled Doors, Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS. Windows: Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay window, Corner window, clear-storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. Ventilators. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja lumns, Beams, ParapetVertical Communication: Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase-steps, tread, riser, nosing, soffit, waist slab, baluster, balustrade, scotia, handrails, newel post, landing, headroom, winder. Types of staircase (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, Three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C., wooden and Metal. Building Components - Functions of Building Components, Substructure -Foundation, Plinth.Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Co

BUILDING FINISHES: Floors and Roofs: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors, Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs. Wall Finishes: Plastering - Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Precautions to be taken in plastering, defects in plastering. Pointing - Necessity, Types of pointing and procedure of Pointing. Painting -Necessity, Surface Preparation for painting, Methods of Application.Brick masonry: Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry header bond, stretcher bond, English bond and Flemish bond. Requirements of good nbrick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite asonry.Scaffolding and Shoring: Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork

E. TEXT BOOKS

T1. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.

T2. Sushil Kumar., Building Construction, Standard Publication.

T3. Rangawala, S. C., Building Construction, Charotar Publication, Anand.

T4. Punmia B. C., and Jain A. K., Building Construction, Firewall Media.

F. REFERENCE BOOKS

R1. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.

R2. Janardan Zha, Building Construction, Khanna Publication.

R3. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.

R4. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.

R5. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Students will summaries basic knowledge about various kind of materials used in construction work.	3	2	-	-	-	1	-	-	-	-	3	2
[CO2]	Students will differentiate about different types of building foundation i.e. shallow and deep foundation, their mechanisms and uses.	2	3	1	-	-	-	-	-	-	-	1	2
[CO3]	Summaries knowledge about various structural members of a building like-walls, door, window, stair, flooring, roof etc.	3	2	1	-	-	-	-	-	-	-	1	-
[CO4]	Extend to apply their knowledge at the time of decision making for application of structural member including material used.	2	3	1	-	-	-	-	-	-	-	1	-
[CO5]	Identify and use of processed construction materials	2	2	1	-	-	-	-	-	-	-	-	-

G. Course Articulation Matrix: (Mapping of COs with POs)

Subject: Basic Surveying Code: DIP13016 3 Credits | Semester III

A. INTRODUCTION:

• To initiate any Civil Engineering Project in Building Construction System, Irrigation Engineering System and Environmental Engineering System, the knowledge and skill of Surveying is a basic requirement for a Civil Engineer. With this knowledge and skillhe will be able to choose appropriate survey and levelling methods, instrument and carry out survey work to prepare required maps. The plans/maps will be further used for designing, estimating and execution of Civil Engineering Works. One should acquire knowledge and develop the skills in surveying.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1]Students will summarize surveying techniques that will remain correct for long period.

- [CO2] Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.
- **[CO3]** Students will learn about Area & Volume calculation.
- [CO4] Students will evaluateabout trigonometrically leveling.
- **[C05]** Students will analyze about simple & complex problems of different instrument methods of Survey.

C. Absessment I fail.									
Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medical							
		leaves.							

C. Assessment Plan:

D. SYLLABUS

TYPES OF SURVEY: Definition. Objects of Surveying, Principles of Surveying.Uses of survey, Classification of Surveying.Primary–Plain, GeodeticSecondary–Based on Instruments, method, object, Nature of field.

CHAIN & CROSS STAFF SURVEY: Principle of Chain Survey. Study and use of Instruments forlinear measurements–chain, Tape, Ranging Rod, arrows, pegs, cross Staff, optical Square, line Ranger.Ranging–Direct and Indirect RangingChaining–Plain and sloping grounds.Chain Triangulation–Survey Station and their Selections, Surveylines, Check lines, Tie lines, baseline. Taking offsets long and short offset, degree of offset. Obstacles in chaining.Chain &cross staff Survey for finding area of a field (Numerical problems) Errorsinchain Surveying

&applying Corrections for chain &Tape (Numerical problems). Conventional signs related to survey.

COMPASS SURVEY: Principle of Compass Survey.Bearing of lines–Meridian–True, Magnetic, and Arbitrary. Bearing–fore bearing, Backbearing, Whole circle bearing, Quad rental bearing system and Reduced bearing,Conversion of bearings, finding included angles from bearings.Prismatic Compass– Component, construction and use.Local attraction, Causes, precautions to be taken to avoid and correction of bearings affected due to local attraction, calculation of included angles.Traversing– open traverse, closed traverse, check on openAnd closed traverse. Graphical adjustment for closing error.Numerical problems on calculation of Bearings, Angles and local attraction.

LEVELING: Definitions–Level surface, Level line, horizontal line, Vertical line, Datum surface, reducedlevel, Benchmark and its types.Dumpy level Components, Construction, Line of sight, Line of Collimation, Bubble tube axis, leveling Staff–Telescopic and folding type. Foresight, back sight, Intermediate sight, Change point, Height of collimation. Fundamental axes and the relationshiprecording in level book. Temporary adjustments of Dumpy level.Method of Reduction of levels– Heightofinstrument method and Rise and fall method. Arithmetical checks, Numerical problems, Computation of missing readings.Classifications of leveling-simple, differential, profile, cross sectional, fly and check leveling.Study and use of tilting level & Auto level.Sources and errors in leveling, precautions and difficulties faced in leveling.

CONTOURING &AREA AND VOLUME MEASUREMENTS: Definitions–Contour, c ontour in terval, Horizontal equivalent.Characteristics of contours. Method of locating contours.Interpolation of contours. Establishing grade contours.Uses of Contour Maps. Interpretation of Typical Contour Sheets.Construction and use of polar planimeter for measurement of are and simple numerical problems.Study and use of Digital Planimeter. Concept of computation of Volume by Trapezoidal and Prismoidal formulae.(Nonumerical problems)

E. TEXT BOOKS

- T1. Surveying and Levelling, N.N.Basak, Tata McGraw-Hill
- T2. Surveying and Levelling Part Iand II, T.P. Kanetkar &S.V, Kulkarni PUNEVIDHYARTHIGRIHA Prakashan
- T3. Surveying and Levelling Vol.IandII, Dr.B.C. Punmiya, Laxmi Plublication
- T4. Textbook of Surveying, S.K. Husain, M.S. Nagaraj, S.Chand and company

F. REFERENCE BOOKS

R1. Surveying and Levelling Vol.IandII, S.K. Duggal, TATAMCGRAW-HILL R2. Plane Surveying, A.M. Chandra, New Age International Publishers

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2
		1	2	3	4	5	6	7	8	9	10		
[CO1]	Students will summarize surveying techniques that will remain correct for long period.	3	3	3	2	3	1	1	1	3	3	3	2
[CO2]	O2] Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.		3	3	2	2	2	1	1	3	2	3	1
[CO3]	Students will learn about Area & Volume calculation.	-	-	-	-	-	-	-	-	-	-	-	1
[CO4]	Students will evaluate about Trigonometrically leveling.		3	3	3	2	2	1	1	3	2	-	-
[CO5]	Students will analyze about simple & complex problems of different instrument methods of Survey.		3	3	3	2	1	1	1	3	2	-	2

Subject: Mechanics of Materials

Code: DIP13175

3 Credits | Semester III

A. INTRODUCTION:

- Strength of Material is a core technology subject. It aims at enabling the student to understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts. The subject is pre-requisite for understanding principles of machine design.
- Understanding mechanical properties of materials will help in selecting the suitable materials for various engineering applications.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- **[C01]** Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections
- [CO2] Analyze structural behaviour of materials under various loading conditions
- **[CO3]** Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.
- **[CO4]** Interpret shear force and bending moment diagrams for various types of beams and loading conditions
- [CO5] Determine the bending and shear stresses in beams under different loading conditions

Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		student to be qualified for taking up the End Semester examination						
		The allowance of 25% includes all types of leaves including media						
		leaves.						

C. ASSESSMENT PLAN:

D. SYLLABUS:

MECHANICAL PROPERTIES OF MATERIALS, SIMPLE STRESSES & STRAINS: Definition of rigid body, plastic body, mechanical properties of metal-Elasticity, Plasticity, Rigidity, Ductility, Malleability, Toughness, Hardness, Brittleness, Creep, Fatigue. Definition of stress, strain, modulus of elasticity, S. I. Unit. Classification of stress, strain, Sign convention. Stress, strain curve for mild steel and HYSD bar, yield stress/ proof stress, Ultimate stress, breaking stress and percentage elongation.Concept & Definition of Simple stresses & strains Types - tensile,compressive, Shear, single & double shear, Punching shear,Thermal stresses, Hoop stresses & corresponding strains. Hooke'slaw, Young's modulus, Modulus of Rigidity. Deformation of body due to axial load. Deformation of a Body subjected to axial forces. Deformation of body of stepped c/s due to axial load, max. Stress and min. Stress induced. Stresses in bars of composite section & deformation.Volumetric Strain, Bulk modulus, Poisson's ratio. Bi- axial & Tri-axialstresses & strains. Relationship among E, G, & K.Stresses & strains in bars of uniformly varying section subjected axial load at ends only, Composite sections having same lengthTemperature stresses & strains of uniform & composite sections.

BENDING MOMENT & SHEAR FORCE: Types of beams - cantilever, simply supported, fixed and continuous beams, types of loading- point load, uniformly distributed load, support reactions for determinate structures Concept & definition of Shear force & bending moment. Relation between rate of loading, shear force & bending moment.Shear force & bending moment diagrams for cantilevers, simply supported beam & over hanging beam subjected to point loads, Uniformly distributed load & and couples, (combination of any two types of loading)Location of point of contra flexure.

MOMENT OF INERTIA: Concept & definition of Moment of inertia, radius of gyration. Parallel & perpendicular axes theorem. (No derivation)Moment of inertia of square, rectangular, circular, semi-circular,Triangular, Hollow square, Rectangular & circular only.MI of angle section, Channel section, Tee- section, I section aboutcentroidal axis & any other axis parallel to centroidal axis.Polar moment of inertia.

COLUMNS: Concept of compression member, short and long column, Effective length, Radius of gyration Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.Euler's theory, assumptions made in Euler's theory and its limitations Application of Euler's equation to calculate buckling loadRankine's formula and its application to calculate crippling load.Concept of working load/safe load, design load and factor of safet

BENDING AND SHEAR STRESSES IN BEAMS: Concept and theory of pure bending, assumptions, flexural equation (without derivation) bending stresses and their nature, bending stress distribution diagram.Concept of moment of resistance and simple numerical problems using flexural equation.Shear stress equation (without derivation), relation between maximum and averageshear stress for rectangular and circular section, shear stress distribution diagram.

E. TEXT BOOKS

T1. F.L. Singer, Strength of Materials, Harpe Collins Publishers India, Delhi T2. R. S. Khurmi, Strength of Materials, S.Chand & Company Delhi

F. REFERENCE BOOKS

R1. S.B. Junnarkar, Mechanics of Structures volume–I&II, Charotar Publishing House, Anand. R2. S Ramamrutham, Strength of Material, Dhanpat Rai & Publication New Delhi

G. Course Articulation Matrix: (Mapping of COs with POs)

STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2
	1	2	3	4	5	6	7	8	9	10		
Articulate practical applications of moment of inertia of	3	3	3	-	-	-	-	-	-	1	3	1
symmetrical and unsymmetrical structural sections												
Analyze structural behavior of materials under various		3	3	-	-	-	-	-	-	1	2	1
loading conditions												
Analyze the column for various loading and end conditions	2	3	3	-	-	-	-	-	-	1	2	1
understand the fundamentals of solid mechanics.												
Interpret shear force and bending moment diagrams for	3	2	3	-	-	-	-	-	-	-	2	-
various types of beams and loading conditions												
Determine the bending and shear stresses in beams under		2	3	-	-	-	-	-	-	1	3	2
different loading conditions												
	STATEMENTArticulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sectionsAnalyze structural behavior of materials under various loading conditionsAnalyze the column for various loading and end conditions understand the fundamentals of solid mechanics.Interpret shear force and bending moment diagrams for various types of beams and loading conditionsDetermine the bending and shear stresses in beams under different loading conditions	STATEMENTCOR PO 1Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections3Analyze structural behavior of materials under various loading conditions3Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.2Interpret shear force and bending moment diagrams for various types of beams and loading conditions3Determine the bending and shear stresses in beams under different loading conditions2	STATEMENTCORRELA PO 1Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections33Analyze structural behavior of materials under various loading conditions33Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.23Interpret shear force and bending moment diagrams for various types of beams and loading conditions32Determine the bending and shear stresses in beams under different loading conditions22	STATEMENTCORRELATIONPO 1PO 2PO 3Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections33Analyze structural behavior of materials under various loading conditions333Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233Interpret shear force and bending moment diagrams for various types of beams and loading conditions323Determine the bending and shear stresses in beams under different loading conditions223	STATEMENTCORRELATION WITPO 1PO 2PO 3PO 4Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections333-Analyze structural behavior of materials under various loading conditions333-Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233-Interpret shear force and bending moment diagrams for various types of beams and loading conditions323-Determine the bending and shear stresses in beams under different loading conditions223-	STATEMENTCORRELATION WITH PRPO 1PO 2PO 3PO 4PO 5Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections333Analyze structural behavior of materials under various loading conditions333Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233Interpret shear force and bending moment diagrams for various types of beams and loading conditions323Determine the bending and shear stresses in beams under different loading conditions223	STATEMENTCORRELATION WITH PROGRAPO 1PO 2PO 3PO 4PO 5PO 6Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections33Analyze structural behavior of materials under various loading conditions333Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233Interpret shear force and bending moment diagrams for various types of beams and loading conditions323Determine the bending and shear stresses in beams under different loading conditions223	STATEMENTCORRELATION WITH PROGRAM SPPOPOPOPOPOPOPOPOPO1234567Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections333Analyze structural behavior of materials under various loading conditions333Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233Interpret shear force and bending moment diagrams for various types of beams and loading conditions323Determine the bending and shear stresses in beams under different loading conditions223	STATEMENTCORRELATION WITH PROGRAM SPECIFPO 1PO 2PO 3PO 4PO 5PO 6PO 7PO 8Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections333Analyze structural behavior of materials under various loading conditions333Analyze the column for various loading and end conditions understand the fundamentals of solid mechanics.233	STATEMENTCORRELATION WITH PROGRAM SPECIFIC OUPO 1PO 2PO 3PO 4PO 5PO 6PO 7PO 8PO 9Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections333	STATEMENTCORRELATION WITH PROGRAM SPECIFIC OUTCOMPO	STATEMENTCORRELATION WITH PROGRAM SPECIFIC OUTCOMESPO<

Subject: Building Construction Code: DIP13159

3 Credits | Semester III

A. INTRODUCTION:

- Building construction is a core subject in civil engineering. This subject is intend for gaining useful knowledge with respect to facts. Concepts ,principles and procedures related to building construction system so that student can effectively plan ,execute building construction work and carry out repairs and maintenance of existing building with quality in construction.
- The subject helps to learn building materials required for construction. It provides necessary knowledge about properties, uses and market rates of building materials

B. COURSE OUTCOMES: By the end of this course, students will be able to:

- [CO1] Identify components of building structures
- **[CO2]** Propose suitable type of foundation for building structures.
- [CO3] Select suitable type of masonry for building structures.
- [CO4] Propose relevant means of communications for different types of buildings.

Criteria		Description	Maximum Marks							
Continuous	Internal	Internal Examination	20							
Assessment (CIA)		Attendance	5							
		Assignment	5							
End	Semester	End Semester Examination	70							
Examination(ESE)										
Total			100							
Attendance		A minimum of 75% Attendance is required to be maintained by								
		student to be qualified for taking up the End Semester examination.								
		The allowance of 25% includes all types of leaves including medical								
		leaves.								

C. ASSESSMENT PLAN:

D. SYLLABUS:

BUILDING COMPONENTS AND MATERIALS: BUILDING COMPONENTS AND TYPES OF STRUCTURE Building components & their function. Substructure – foundation, plinth. Superstructure – walls, sill, lintel, doors & windows, Floor, roof, parapet, beams, columns. Types of Structures – Load bearing Structures, framed Structures, composite structures.MASONRY MATERIALSA) Building Stones- Classification of rocks, Requirement of good building stone, dressing of stones, quarrying of stones, artificial or cast stones b) Bricks – conventional bricks, standard bricks composition of clay brick, strength of bricks, Proportions of burnt clay bricks, testing of bricks, special bricks, hollow blocks, fly ash bricks. c) Mortars– classifications, Lime mortar, cement mortar, special mortars. Functions of mortar, proportions, properties of mortar and tests for mortar. TIMBER BASED MATERIAL Use of timber, Characteristics of good timber, defects in timber, Plywood, particle board, veneer, sun mica, fore mica, Nuwood, artificial timber, rubber wood.

CONSTRUCTION OF SUBSTRUCTURE: JOB LAYOUT Site clearance, preparing job layout, layout for load bearing structure and framed structure by center line and face line method, precautions while marking layout on ground . EARTHWORK Excavation for foundation, timbering and strutting Earthwork for embankment, material for plinth filling. Tools and plants used for excavation and earthwork. FOUNDATION Definition, purpose, Types of foundation. Shallow foundation - Wall footing, isolated and combined column footing, stepped foundation, raft foundation, deep foundation - Pile foundation - Types Bearing, friction, sheet, anchor, batter, fender piles. Cofferdams-Definition, types- Earthen, rock-fill, singled walled, double walled construction and use.Under reamed pile foundation. Pumping method of dewatering, bearing capacity of foundation soil, STONE MASONRY: Terms used in stone masonry - Facing, backing, hearting, through stone, corner stone etc. Uncoursed rubble masonry, coursed rubble masonry, point to be observed in construction of stone masonry, mortars for stone masonry, tools and plants used for stone masonry, Col- grout masonry.BRICK MASONRY- Common terms used in brick masonry, Requirements of good brickwork, bonds Flemish, Stretcher and header bonds only. Brick laving, in brick masonry, English, Line, level and plumb of brickwork, striking and raking of joints, lead and lift, precautions in brick masonry, tools and plants used in brick masonry. Comparison between brick and stone Hollow concrete block masonry, composite masonry, Cavity wall- purpose and masonry. construction.DOORS AND WINDOWSDoors -Components and construction - panelled doors, battened doors, flush doors, collapsible doors, rolling shutters, Revolving doors, Glazed doors. Sizes of door. Windows -Component and construction - fully panelled, partly panelled and glazed, glazed wooden, steel, Aluminum windows, sliding windows, louvered window, ventilators, cement grills. Protective treatment for doors and windows, fixtures and fastenings for doors and window. Sill, lintel and weather shed- functions, types and construction.VERTICAL COMMUNICATIONMeans of vertical communication – Stair case, Elevator or lift, escalator, ramp, terms used in stair-case, requirement of good stair-case, types of stair-case, fabricated stair.SCAFFOLDING AND SHORINGPurpose, Types of scaffolding, process of erection and dismantling. Purpose and types of shoring, Underpinning, safety precautions.

BUILDING FINISHES: FLOORSANDROOFS - Floor finishes-Shahabad, kota, marble, granite, Kadappa, Ceramictiles, vitrified, mosaic tiles, chequerredtiles ,glazed tiles ,pavement blocks ,concrete floors, tremix floor, skirting and dado. Process of laying-Process of laying and construction, finishing and polishing of floors. Roofing materials-AC sheets, G.I. sheets, plastic R.C.C.SLAB, sheets. fibre sheets, Mangalore tiles etc. Steel trusses. WALLFINISHESPlastering-Necessity of plastering, Single coat plasterDouble coat plaster, Neeru finishing and POP, special plasters stucco plaster, plaster board and wall claddings .Precaution to be taken while plastering .Defects in plaster. Pointing-Necessity and procedure of
pointing. Painting –Necessity, Surface preparation, method of application, selecting suitable painting material, white wash and colorwash.

BUILDING MAINTENANCECRACKS: Cause sand types of cracks, identification and repair of cracks. Guniting and grouting, use of epoxy and crack fills.**SETTLEMENT**Settlement–causes and remedial measures, Plinth protection–Necessity and materials used.

E. TEXT BOOK

- T1. Construction Materials, D.N. Ghose, Tata McGraw-Hill
- T2. Building materials, Amarjit Agrawal, New India Publication
- T3. Building materials, S.K. Duggal, New Age International
- T4. Engineering materials, S.K. Sharma, PHI Publication
- T5. Building Construction, S.P. Aroraand Bindra, Dhanpat Rai Publication
- T6. Building Construction, S.C. Rangawala, Charotar Publication

F. REFERENCES

- R1. Building Construction, Sushil Kumar, Standard Publication
- R2. Building Construction, B.C. Punmia, Laxmi Publication
- R3. Building Construction, S.K. Sharma, Tata McGraw-Hill
- R4. Civil Engineering materials, TTTI, Madras, TTTI, Madras
- R5. A toZ of Building Construction, Mantri Construction, Mantri Publication

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify components of building structures	3	2	-	-	-	1	-	-	-	-	3	2
[CO2]	Propose suitable type of foundation for building structures.	2	3	1	-	-	-	-	-	-	-	1	2
[CO3]	Select suitable type of masonry for building structures.	3	2	1	-	-	-	-	-	-	-	1	-
[CO4]	Propose relevant means of communications for different	2	3	1	-	-	-	-	-	-	-	1	-
	types of buildings.												

Subject: Geo-Technical Engineering Code:DIP14023 3 Credits | Semester III

A. INTRODUCTION:

• Every engineering structure such as building, bridges, dams, towers, monuments etc. are support by soil and rock. The stability of these structures depends upon behaviors of soil and capacity of soil to carry loads under different environmental conditions. The soil & rock is also used as construction materials for embankments, roads, dams, mud walls etc. Thus it becomes mandatory to learn this subject which includes knowledge of physical properties, classification of soil, its behaviors and various techniques to improve soil properties

B. COURSE OUTCOMES: By the end of this course, students will be:

[CO1]Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils

[CO2] Compute the groundwater seepage and distribution of groundwater pressure

- **[CO3]** Calculate the applied stress beneath the ground surface.
- **[CO4**] Demonstrate that you know the fundamental difference in the strength and deformation characteristics of cohesive and cohesion less soils.

[C05] Analyze field and laboratory data to determine the strength and deformation properties of cohesive and cohesion less soils.

Criteria		Description	Maximum Marks				
Continuous	Internal	Internal Examination	20				
Assessment (CIA)		Attendance	5				
		Assignment	5				
End	Semester	End Semester Examination	70				
Examination(ESE)							
Total			100				
Attendance		A minimum of 75% Attendance	is required to be maintained by a				
		student to be qualified for taking up the End Semester examination					
		The allowance of 25% includes all	l types of leaves including medical				
		leaves.					

C. ASSESSMENT PLAN:

D. SYLLABUS:

OVERVIEW OF GEOTECHNICAL ENGINEERING & SITE INVESTIGATION AND SUB SOIL EXPLORATION: Is definition of soil, Importance of soil in Civil Engineering asconstruction material in Civil Engineering Structures, as foundation bedfor structures Necessity of site investigation & sub-soil exploration, types of exploration – general & detailed, method of site exploration openexcavation & boring, criteria for deciding the location and number oftest pits and boresDisturbed & undisturbed soil samples for lab testing. Field identification f soil – dry strength test, dilitancy test & toughness test, empirical correlation between soil properties and SPT values. **PHYSICAL PROPERTIES OF SOIL:** Soil as a three phase system, water content, etermination of watercontent by oven drying method as per IS code, void ratio, porosity anddegree of saturation, density index, unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight, determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code, specific gravity, determination of specific gravity by pycnometer.

Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index, determination of liquid limit, plastic limit and shrinkage limit as per IS code.Particle size distribution, mechanical sieve analysis as per IS codeparticle size distribution curve, effective diameter of soil, Uniformitycoefficient and coefficient of curvature, well graded and uniformlygraded soils, particle size classification of soils & IS classification of soil.

PERMEABILITY OF SOIL, SEEPAGE ANALYSIS & SHEAR STRENGTH OF SOIL: Definition of permeability, Darcy's law of permeability, coefficient ofpermeability, typical values of coefficient of permeability for different soil, factors affecting permeability, determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeabilitySeepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines, flow net, characteristics of flow net, application of flow net (no numerical problems)Shear failure of soil, field situation of shear failure, concept of shearstrength of soil, components of shearing resistance of soil – cohesion, internal friction.Mohr-coulomb failure theory, Strength envelope, strength of soil – Direct shear test, unconfined compression test & Vane shear test, plotting strengthenvelope, determining shear strength shear parameters of soil.

BEARING CAPACITY OF SOILS & EARTH PRESSURE: Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure, Terzaghi's analysis and assumptions made, effect of water table on bearing capacityField methods for determination of bearing capacity – Plate load testand standard penetration test. Test procedures as Per IS:1888 &IS:2131, typical values of bearing capacity from building code IS:1904.Definition of earth pressure, active earth pressure and passive earth pressure, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive soils, total earth pressure distribution diagram for non- cohesive soils having dry backfill, submerged backfill and surcharge for horizontal plane surface.

COMPACTION OF SOIL & STABILIZATION: Concept of compaction, purpose of compaction field situations where compaction is required, Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line, Modified proctor test, factors affecting compaction, field methods of compaction –

rolling, ramming & vibration and Suitability of various compaction equipments, difference betweencompaction and consolidation.Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ashstabilization, California bearing ratio, CBR test, significance of CBR value

E. TEXT BOOK

- T1. Dr.B.C.Punmia, Soil Mechanics &Foundation Engineering, Standard Book house, New Delhi
- T2. Murthi Soil Mechanics & Foundation Engineering, Tata McGraw Hill, New Delhi

F. REFERENCES

R1. B.J.Kasmalkar, Soil Mechanics, Pune Vidhyarti Griha, Pune

R2. Gulhati &Dutta, Geo-technical Engineering, Tata McGraw Hill ,NewDelhi

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils	2	3	3	1	-	1	-	-	-	-	2	1
[CO2]	Compute the groundwater seepage and distribution of groundwater pressure	1	3	2	2	-	2	_	-	-	2	2	1
[CO3]	Calculate the applied stress beneath the ground surface.	2	3	3	2	2	2	-	-	-	1	2	-
[CO4]	Demonstrate that you know the fundamental difference in the strength and deformation characteristics of cohesive and cohesion less soils.	1	3	3	1	-	-	-	-	-	1	3	1
[CO5]	Analyze field and laboratory data to determine the strength and deformation	-	1	3	2	-	-	-	-	-	1	3	-

Subject: Essence of Indian Knowledge Tradition Code: DIP13172 0 Credits | Semester IV

A. Introduction:

• The course aims at imparting basic principles of thought process, reasoning and differencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Basic principles of thought process, reasoning and differencing.
- [CO2] Introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care systems.
- [CO3] Focuses on Indian philosophical traditions, Indian linguistic tradition and Indian artistic tradition.

Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	10					
Assessment (CIA)		Attendance	2.5					
		Assignment	2.5					
End	Semester	End Semester Examination	35					
Examination(ESE)								
Total			50					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		student to be qualified for taking up the End Semester examination						
		The allowance of 25% includes all types of leaves including media						
		leaves.						

C. Assessment Plan:

D. SYLLABUS

BASIC STRUCTURE OF INDIAN KNOWLEDGE SYSTEM: Basic structure of Indian Knowledge System. अष्टादशविद्या -४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि)

BASIC STRUCTURE OF INDIAN KNOWLEDGE SYSTEM: ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाड्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)

MODERN SCIENCE AND INDIAN KNOWLEDGE SYSTEM:Modern Science and Indian Knowledge System.

YOGA AND HOLISTIC HEALTH CARE LAWS: Yoga and Holistic Health care.

CASE STUDIES: Case studies.

E. TEXT BOOKS

T1. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya.

T2.Vidya Bhavan, Mumbai. 5th Edition, 2014 SwamiJitatmanand, Modern Physics and Vedant, BharatiyaVidyaBhavan

T3Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan.

T4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset T5Fritzof Capra, The Wave of life .

F. REFERENCE BOOKS

R1. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay

- R2. Foundation, Velliarnad, Arnakulam Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata
- R3. GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with Vyasa Bhashya
- R4. VidyanidhiPrakashan, Delhi 2016 RNJha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidhi
- R5.Prakashan, Delhi 2016 P B Sharma (English translation), ShodashangHridayan

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	RELA	٩T	CORR	ELAT	ION V	WITH	PRO	GRAM	I SPE	CIFIC			
		ION WITH		OUTCOMES											
		PRO	GRA	М											
		OUI	COM	Е											
		S													
		РО	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2		
		1	2	3	4	5	6	7	8	9	10				
[CO1]	Basic principles of thought process, reasoning and differencing.						2	1							
[CO2]	Introduction to Indian Knowledge Systems, Indian						1				1				
	perspective of modern scientific world-view and basic														
10021	Francipies of Foga and nonstic fleatin care systems.										1				
[003]	Focuses on Indian philosophical traditions, Indian linguistic										1				
	tradition and metan artistic tradition.														

Subject: Construction Material Lab

Code: DIP13165

1 Credits | Semester III

A. Introduction:

- The objective of this course is to understand the characteristics and behavior of civil engineering materials used in buildings and infrastructure. Students will learn standard principles and procedure to design prepare and/or test materials such as concrete mix design including field test methods for fresh concrete. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.
- B. Course Outcomes: At the end of the course, students will be able to
- **[C01]** Able to Impart the knowledge about the characteristics, sources and defects in various materials used for construction purposes.
- **[CO2]** Able to design and test the materials either in the laboratory or in the field before their actual use at the site
- **[CO3]** Able to attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures
- **[CO4]** Able to understand the types and functions of main building services to be provide and the defects in the buildings along with the remedial measures for proper maintenance of the buildings

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leave						
	including medical leaves.						

C. Assessment Plan:

D. SYLLABUS

Sl.No	Name of Practical
1	Identify various sizes of available coarse aggregates from sample of 10 kg
2	Identify the available construction materials

3	Identify the grain distribution pattern in given sample of teak wood and draw the various patterns. (along and perpendicular to the grains)
4	Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and prepare report on slaking of lime
5	Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples
6	Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties

E. TEXT BOOKS

T1. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.

T2. Sushil Kumar., Building Construction, Standard Publication.

T3. Rangawala, S. C., Building Construction, Charotar Publication, Anand.

T4. Punmia B. C., and Jain A. K., Building Construction, Firewall Media.

F. REFERENCE BOOKS

R1. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.

R2. Janardan Zha, Building Construction, Khanna Publication.

R3. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.

R4. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.

R5. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Able to Impart the knowledge about the characteristics, sources and defects in various materials used for construction purposes.	1	2	-	2	-	-	-	-	-	-	3	2
[CO2]	Able to design and test the materials either in the laboratory or in the field before their actual use at the site	1	3	3	2	-	-	-	-	-	1	3	2
[CO3]	Able to attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures	1	3	3	-	-	-	-	-	-	-	2	-
[CO4]	Able to understand the types and functions of main building services to be provide and the defects in the buildings along with the remedial measures for proper maintenance of the buildings	2	3	3	-	-	-	-	-	-	-	1	-

Subject: Mechanics of Materials Lab

Code: DIP13176

1 Credits | Semester III

A. Introduction:

- This subject is about the performance of deformable solids in various materials under the Action of different kinds of loads. Thus the main objective of the course will be to show howto determine the stress, strain, and deflection suffered by bi-dimensional. Understanding theadequacy of mechanical and structural elements under different loads is essential for thedesign and safe evaluation of any kind of structure.
- B. Course Outcomes: At the end of the course, students will be able to
- **[C01]** Understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve problems for simple tridimensional elastic solids
- [CO2] Calculate and represent the stress diagrams in bars and simple structures
- **[CO3]** Solve problems relating to pure and non-uniform bending of beams and other simple structures
- **[CO4]** Solve problems relating to torsional deformation of bars and other simple tri-dimensional structures
- **[C05]** Understand the concept of buckling and be able to solve the problems related to isolated bars

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leave						
	including medical leaves.						

C. Assessment Plan:

D. SYLLABUS

S.No.	Name of Experiment
1	Identify the components of universal testing machine & tension test on mild steel
2	Tension test on to steel / deformed bars
3	I zod Impact test on mild steel, brass, copper and cast iron
4	Chirpy impact test on mild steel, brass, copper and cast iron.

5	Flexural test on timber.
6	Flexure test on floor tiles or roofing tiles
7	Shear Test on metal
8	Water Absorption & Compression test (Dry &Wet) on bricks
9	Abrasion Test on flooring tiles.

E. TEXT BOOKS

T1. F.L. Singer, Strength of Materials, Harpe Collins Publishers India, Delhi T2. R. S. Khurmi, Strength of Materials, S.Chand & Company Delhi

F. REFERENCE BOOKS

R1. S.B. Junnarkar, Mechanics of Structures volume–II&Charotar Publishing House, Anand, I. R2. S Ramamrutham, Strength of Material, Dhanpat Rai & Publication New Delhi

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	CO1] Understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve problems for simple tridimensional elastic solids			3	-	-	-	-	-	-	1	3	-
[CO2]	2] Calculate and represent the stress diagrams in bars and simple structures		3	3	-	-	-	-	-	-	-	1	-
[CO3]	Solve problems relating to pure and non-uniform bending of beams and other simple structures		2	3	3	-	-	-	-	-	-	1	-
[CO4]	Solve problems relating to torsional deformation of bars and other simple tri-dimensional structures	1	2	3	3	-	-	-	-	-	1	1	2
[CO5]	Understand the concept of buckling and be able to solve the problems related to isolated bars	1	3	3	3	-	-	-	-	-	1	1	2

Subject: Geo-Technical Engineering Lab

Code:DIP14029

1 Credits | Semester III

A. Introduction:

• Provide civil engineering students with the basic knowledge to Carry out field investigations and to identify soils in Geotechnical engineering practice .Knowledge of and ability to perform laboratory tests needed to Determine soil design parameters.

B. Course Outcomes: At the end of the course, students will be able to

- **[C01]** Knowledge of site-specific field investigations including collection of soil samples for testing and observation of soil behavior/ Building damage
- [CO2] Be able to identify and classify soil based on standard geotechnical engineering practice
- [CO3] Be able to determination of shear strength of soil using direct shear test.
- **[CO4]** Be able to determination of CBR value of given soil sample.
- **[CO5]** Be able to determination of coefficient of permeability by constant head test

C. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taki	ng up the End Semester					
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

D. SYLLABUS

Sl.No	Name of Practical
1	DeterminationofwatercontentofgivensoilsamplebyovendryingmethodasperISCode
2	Determinationofbulk unitweightdry unitweightofsoilinfieldbycorecuttermethodasperISCode
3	Determinationofbulkunitweightdryunitweightofsoilinfieldbysandreplacementmethod as per IS Code.
4	DeterminationofLiquidlimit&Plasticlimitofgivensoilsample asperISCode
5	Determination of grain size distribution of given soil sample by mechanical sieveanalysisasperISCode
6	Determinationofcoefficientof permeabilitybyconstantheadtest

7	Determinationofcoefficientof permeabilitybyfallingheadtestPractical(Livedemoor
	Pre-recordeddemo)
8	Determinationofshearstrengthofsoilusing directsheartest
9	DeterminationofshearstrengthofsoilusingLaboratoryVanesheartest
10	Determination of MDD&OMCby standardproctortestongivensoilsampleasperISCode
11	DeterminationofCBRvalueofgivensoilsample.
12	Determinationofshearstrengthofsoilusing unconfinedimpressivestrength.
13	Determinationofshearstrengthofsoilusingtri-axialsheartest

E. TEXT BOOK

- T1. Dr.B.C.Punmia, Soil Mechanics &Foundation Engineering, Standard Book house, New Delhi
- T2. Murthi Soil Mechanics & Foundation Engineering, Tata McGraw Hill, New Delhi

F. REFERENCES

- R1. B.J.Kasmalkar, Soil Mechanics, Pune Vidhyarti Griha, Pune
- R2. Gulhati &Dutta, Geo-technical Engineering, Tata McGraw Hill ,NewDelhi

F. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Knowledge of site-specific field investigations including collection of soil samples for testing and observation of soil behavior/ Building damage	2	2	2	-	-	-	-	-	-	-	2	2
[CO2]	Be able to identify and classify soil based on standard geotechnical engineering practice	1	2	1	1	-	-	-	-	-	-	3	1
[CO3]	Be able to determination of shear strength of soil using direct shear test.	2	3	2	-	-	-	-	-	3	-	2	-
[CO4]	Be able to determination of CBR value of given soil sample.	2	3	1	-	-	-	-	-	-	3	1	-
[CO5]	Be able to determination of coefficient of permeability by constant head test	1	2	2	2	-	-	-	-	2	3	2	2

Subject: Basic Surveying Lab

Code: DIP13019

1 Credits | Semester III

A. Introduction:

- Identify the different instruments for Line a measurement and leveling. Record and observing necessary Observation with the survey instruments. Classify and discriminating various types of survey instruments. Identify the errors of the survey instruments
- B. Course Outcomes: At the end of the course, students will be able to
- [CO1] Measure distances, bearings and finding reduced levels with survey instruments.
- **[CO2]** Prepare drawing using survey data.
- **[CO3]** Prepare contour map of a given terrain/topography.
- [CO4] Measure area of an irregular shape figure with plan meter.

C. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

D. SYLLABUS

Sl.No	Name of Practical
1	Determination of Pace
2	Measurement of distances with chain & Tape on ground with direct & indirect ranging.
3	MeasurementofAreabyChain(Closed Traverse)
4	Chaining across Obstacles
5	Chain Surveying (Mapping by Tape)
6	DifferentialevelingpracticereductionoflevelbyH.I.method and Rise & Fall method
7	Closed Loop Leveling
8	Profile Leveling (Longitudinal Sectioning & Cross Sectioning)

9	Contouring- Grid Method
10	Measuring F.B and B.B (5-6 sided) and identifying stations affected by local attractions
	and relative corrections.
11	Useofautolevelandtakingobservation.
12	MeasurementofAreaofirregularfigurebypolarplanimeter.
13	Measuringareenclosed
	by closed contours on contour appeared earlier, by simple digital planmeter

D. TEXT BOOKS

- T1. Surveying and Levelling, N.N.Basak, Tata McGraw-Hill
- T2. Surveying and Levelling Part Iand II, T.P. Kanetkar &S.V, Kulkarni PUNEVIDHYARTHIGRIHA Prakashan
- T3. Surveying and Levelling Vol.IandII, Dr.B.C. Punmiya, Laxmi Plublication
- T4. Textbook of Surveying, S.K. Husain, M.S. Nagaraj, S.Chand and company

E. REFERENCE BOOKS

R1. Surveying and Levelling Vol.IandII, S.K. Duggal, TATAMCGRAW-HILL

R2. Plane Surveying, A.M. Chandra, New Age International Publishers

F. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Measure distances, bearings and finding reduced levels with survey instruments.	2	3	3	2	-	-	-	-	-	1	3	1
[CO2]	Prepare drawing using survey data.	1	3	3	-	-	-	-	-	-	-	1	2
[CO3]	Prepare contour map of a given terrain/topography.		2	3	-	-	-	-	-	-	1	1	-
[CO4]	Measure area of an irregular shape figure with plan meter.		3	3	-	-	-	-	-	-	2	2	-

Subject:Summer Internship-1(3-4 Weeks)

Code:DIP13177 2 Credits | Semester III

A. Introduction:

- Following are the intended objectives of internship training:
- Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Experience gained from the 'Industrial Internship' in classroom will be use in classroom discussions.
- Create conditions conducive to quest for knowledge and its applicability on the job

GUIDELINES FOR INTERNSHIP

Summer Internship -1 should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/ Govt. Skill Centres/Institutes/Schemes.

S.No.	Suggested Schedule	Suggested Duration (In weeks)	Activities
1	Summer/winter vacation after 2nd/3rd Semester	3-4	Inter/Intra Institutional Activities



Syllabus of Diploma in Civil Engineering Semester-IV

ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70 20		5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	155 110		42.5

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5 5		5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(**Group-B**)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47 .5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20	5	5
2	Advanced Surveying	PCC	3	3	100	70	20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance	
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5	
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5	
	Elective-II									
	Traffic Engineering			3	100					
3	Solid Waste Management	PEC	3			70	20	5	5	
	Advanced Construction Technology									
4	Elective-III Pavement Design & maintenance									
	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5	
	Building Services and Maintenance									
5	Open Elective-I Engineering Economics & Accountancy Renewable Energy	OEC	3	3	100	70	20	5	5	
	Numerical Methods									
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5	
	Practical									
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5	
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5	
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0	
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0	
	TOTAL		24	24	900	630	190	40	40	

Project to be carried over to next semester

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance	
1	Public Health Engineering	HSMC	3	3	100	70	70 20		5	
	Elective-IV									
	Repairs and Maintenance of Structures			3	100			5		
2	Advanced Design of Structures	PEC	3			70	20		5	
	Tendering and Accounts									
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5	
	Open Elective-II									
	Project Management									
4	Disaster Management	OEC	3	3	100	70	20	5	5	
	Operations Research									
	Open Elective-III									
	Sustainable Development	OEC								
5	Artificial Intelligence		3	3	100	70	20	5	5	
	History of Science and Engineering									
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5	
	Practical									
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5	
7	Seminar	PROJ	1	2	50	35	5	5	5	
8	Major Project-II	PROJ	3	0	100	100	0	0	0	
	TOTAL		21	20	700	520	110	35	35	

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	18
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	47
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	6	12
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
	Total	58	124

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card.

The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

Subject: Hydraulics

Code: DIP14192

3 Credits | Semester IV

A. INTRODUCTION:

- To understand parameters associated with fluid flow and hydrostatic pressure.
- To know head loss and water hammer in fluid flowing through pipes.
- To learn different types of pumps and their uses.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Measure pressure and determine total hydrostatic pressure for different conditions.

[CO2] Understand various parameters associated with fluid flow

[CO3] Determine head loss of fluid flow through pipes.

[CO4] Find the fluid flow parameters in open channels.

[C05] Select relevant hydraulic pumps for different applications.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. Assessment Plan:

D. SYLLABUS

PRESSURE MEASUREMENT AND HYDROSTATIC PRESSURE: Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics. Physical properties of fluid – density-specific volume, specific gravity, surface tension, capillarity, viscosity-Newton's law of viscosity. Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Concept of Pressure head and its unit, Pascal's law of fluid pressure and its uses. Measurement of differential Pressure by different methods. Variation of pressure with depth, Pressure diagram, hydrostatic pressure and center of pressure on immersed surfaces and on tank walls. Determination of total pressure and center of pressure on sides and bottom of water tanks, sides and bottom of tanks containing two liquids, vertical surface in contact with liquid on either side. **FLUID FLOW PARAMETERS:** Types of flow – Gravity and pressure flow, Laminar, Turbulent, Uniform, Non-uniform, Steady, Unsteady flow, Reynolds number. Discharge and its unit, continuity equation of flow. Energy of flowing liquid: potential, kinetic and pressure energy. Bernoulli's theorem : statement, assumptions, equation. Discharge and its unit, continuity equation of flow. Energy of flowing liquid: potential, kinetic and pressure energy. Bernoulli's theorem : statement, assumptions, equation.

FLOW THROUGH PIPES: Major head loss in pipe: Frictional loss and its computation by Darcy's Weisbach equation, Use of Moody's Diagram and Nomograms. Hydraulic gradient line and total energy line. Minor losses in pipe: loss at entrance, exit, sudden contraction, sudden enlargement and fittings. Flow through pipes in series, pipes in parallel and Dupuit's equation for equivalent pipe. Water hammer in pipes: Causes and Remedial measures. Discharge measuring device for pipe flow: Venturi meter - construction and working. Discharge measurement-using Orifice, Hydraulic Coefficients of Orifice.

FLOW THROUGH OPEN CHANNEL: Geometrical properties of channel section: Wetted area, wetted perimeter, hydraulic radius for rectangular and trapezoidal channel section. Determination of discharge by Chezy's equation and Manning's equation. Conditions for most economical rectangular and trapezoidal channel section. Discharge measuring devices: Triangular and rectangular Notches. Velocity measurement devices: current meter, floats and Pitot's tube. Specific energy diagram, Froudes' Number

BUILDING MAINTENANCE:Concept of pump, Types of pump - centrifugal, reciprocating, submersible. Centrifugal pump: components and working Reciprocating pump: single acting and double acting, components and working. Suction head, delivery head, static head, Manometric head Power of centrifugal pump. Selection and choice of pump

E. TEXT BOOKS

- T1. Modi, P. N.and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
- T2. S.S. Rattan, Fluid Mechanics & Hydraulic Machines, Khanna Book Publishing Co., New Delhi
- T3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.
- T4. Khurmi R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S. Chand Publishers

F. REFERENCE BOOKS

R1. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.

R2. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University Press, New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Measure pressure and determine total hydrostatic pressure for different conditions.	2	3	3	1	-	-		-	-	2	3	-
[CO2]	Understand various parameters associated with fluid flow	2	3	1	-	-	-	-	-		-	3	1
[CO3]	Determine head loss of fluid flow through pipes.	-	3	3	2	-	-	-	-	-	1	3	1
[CO4]	Find the fluid flow parameters in open channels.	1	3	-	-	-	-		-	-	1	2	2
[CO5]	Select relevant hydraulic pumps for different applications.	1	3	3	2	-	-	-	-	-	-	3	-

G. Course Articulation Matrix: (Mapping of COs with POs)
Subject: Advanced Surveying

Code: DIP14021

3 Credits | Semester IV

A. INTRODUCTION:

- To know methods of plane surveying and Theodolite surveying and their uses
- To learn tachometric surveying and curve setting
- To understand the principles of Electronic Distance Measurement equipment and Total station and their use.
- To know the concept of remote sensing, GPS and GIS
- B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1]Students will predict the help of Theodolite.

- [CO2] Students will analyze the method of triangulations.
- [CO3] Students will evaluate the different types of curves and methods to set them out.
- [CO4] Prepare plans using Total Station instrument.
- [CO5] They will interpret different modern techniques using Surveying instrument such as Total Station, GPS etc.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

C. SYLLABUS

PLANE TABLE SURVEYING: Principles of plane table survey. Accessories of plane table and their use, Telescopic alidade Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method, True Meridian Method.Methods of plane table surveys-Radiation, Intersection and Traversing. Merits and demerits of plane table survey.

THEODOLITE SURVEYING: Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite. Technical terms-Swinging, Transiting, Face left, Face right. coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation. Fundamental axes of transit Theodolite and their relationship Temporary adjustment of transit Theodolite.

Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition. Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle. Measurement of vertical Angle. Theodolite traversing by Included angle method and Deflection angle method. Checks for open and closed traverse, Calculations of bearing from angles. Traverse computation-Latitude, Departure, Consecutive

TACHEOMETRIC SURVEYING AND CURVE SETTING: Principles of Tacheometry, acheometer and its component parts, Anallatic lens. Tacheometric formula for horizontal distance with telescope horizontal and staff vertical. Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry. Types of curves used in roads and railway alignments. Designation of curves. Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.

ADVANCED SURVEYING EQUIPMENTS: Principle of Electronic Distance Meter (EDM), its component parts and their Functions, use of EDM. Use of micro optic Theodolite and Electronic Digital Theodolite. Use of Total Station, Use of function keys. Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.

REMOTE SENSING, GPS AND GIS: Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil engineering, land use / Land cover, mapping, disaster management. Use of Global Positioning System (G.P.S.) instruments. Geographic Information System (GIS): Over view, Components, Applications, Software for GIS. Introduction to Drone Surveying.

E. TEXT BOOKS

- T1. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education, Noida.
- T2. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

F. REFERENCE BOOKS

- R1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
- R2. Basak, N. N., Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd., Noida.
- R3. Duggal, S. K., Survey Survey II, Tata McGraw Hill Education Pvt. Ltd. and Noida, I.
- R4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
- R5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.
- R6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol.II, Laxmi Publications Pvt. Ltd., New Delhi.
- R7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.
- R8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Students will predict the help of Theodolite.	1	3	3	2	-	-	-	-	-	-	3	1
[CO2]	2] Students will analyze the method of triangulations.		3	3	2	-	-	-	-	-	-	2	1
[CO3]	Students will evaluate the different types of curves and methods to set them out.	3	3	3	2	-	-	-	-	-	-	2	2
[CO4]	Prepare plans using Total Station instrument.	3	3	3	3	3	2	-	-	-	-	-	2
[CO5]	They will interpret different modern techniques using Surveying instrument such as Total Station, GPS etc.	3	3	2	-	1		-	-	-	-	3	1

Subject: Theory of Structures Code:DIP15032

3 Credits | Semester IV

A. INTRODUCTION:

- To learn concept of eccentric loading and stresses in vertical members like column, chimneys, dam.
- To analyze beams using various methods like slope deflection, three moment, and moment distribution.
- To understand different methods of finding axial forces in trusses.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Identify determinacy and indeterminacy of structure.

[CO2] Analyze slope and Deflection in fixed and continuous beams.

[CO3] Different procedures to calculate slope and defection for determinate structure.

[CO4] Interpret Influence line diagram and its detail application

[CO5] Evaluate axial forces in the members of simple truss.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS

DIRECT AND BENDING STRESSES IN VERTICAL MEMBERS: Introduction to axial and eccentric loads, eccentricity about one principal axis only, nature of stresses, Maximum and minimum stresses, resultant stresses and distribution diagram. Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule. Chimneys of circular cross section subjected to wind pressure, Maximum and minimum stresses, resultant stresses and distribution diagram at base. Analysis of dams subjected to horizontal water pressure, conditions of stability, Maximum and minimum stresses, resultant stresses and distribution diagram at base.

SLOPE AND DEFLECTION: Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation). Double

integration method to find slope and deflection of cantilever and simply supported beams subjected to concentrated load and uniformly distributed load on entire span. Macaulay's method for slope and deflection, application to cantilever and simply supported beam subjected to concentrated and uniformly distributed load on entire span.

FIXED AND CONTINUOUS BEAM: Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam. Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span. Application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam. Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, practical examples. Clapeyron's theorem of three moment (no derivation), Application of Clapeyron's theorem maximum up to three spans and two unknown support moment only, Support at same level spans having same and uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF diagrams showing point of contraflexure, shear and BM diagrams showing net BM and point of contraflexure for continuous beams.

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution factor. Application of moment distribution method to various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia, supports at same level, up to three spans and two unknown support moments only. Introduction to portal frames – Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.

SIMPLE TRUSSES: Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, North light truss, King post and Queen post truss) Calculate support reactions for trusses subjected to point loads at joints Calculate forces in members of truss using Method of joints and Method of sections.

E. TEXT BOOKS

- T1. Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
- T2. Agor R, Structural Analysis, Khanna Publishing House, Delhi.

F. REFERENCE BOOKS

- R1. Ramamrutham.S, Theory of structures, Dhanpatrai & Sons.
- R2. Khurmi, R. S., Theory of Structures S. Chand and Co., New Delhi.
- R3. Bhavikatti, S S, Structural Analysis Vol-1, ,Vikas Publishing House Pvt Ltd.New Delhi.
- R4 Junnarkar, S. B., Mechanics of structures, Volume-I and II Charotar Publishing House, Anand.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify determinacy and indeterminacy of structure.	3	3	2	2	-	-	-	-	-	-	1	2
[CO2]	Analyze slope and Deflection in fixed and continuous beams.	3	3	2	2	-	-	-	-	-	-	2	3
[CO3]	Different procedures to calculate slope and defection for determinate structure.	3	3	3	3	1	1	-	-	-	2	2	1
[CO4]	Interpret Influence line diagram and its detail application	3	3	3	3	-	_	_	_	-	3	-	-
[CO5]	Evaluate axial forces in the members of simple truss.	3	3	2	2	2	-	-	-	-	3	-	-

Subject: Transportation Engineering

Code: DIP14210

3 Credits | Semester IV

A. INTRODUCTION:

- To identify the types of roads as per IRC recommendations.
- To understand the geometrical design features of different highways.
- To perform different tests on road materials.
- To identify the components of railway tracks.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Identify the types of roads as per IRC recommendations
- **[CO2]** Implement the geometrical design features of different highways.
- **[CO3]** Students will receive the introduction and history of highway engineering and economics also which will remain correct for long period oftime.
- **[CO4]** Students will get the knowledge about the traffic engineering and components of traffic such as traffic signs, signals, design of traffic signalsdesign, rotary intersection, Volume studies, speed studies etc.
- **[C05]** Students will examine and test materials of highway such as Soil, Stone Aggregate, Bitumen, Marshal Stability Test etc. Also get knowledge about construction of highway.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS

OVERVIEW OF HIGHWAY ENGINEERING: Role of transportation in the development of nation, Scope and Importance of roads in India and its' Characteristics. Road Plans & Jayakar Committee Recommendations.Different modes of transportation – land way, waterway, airway. Merits and demerits of roadway and railway; General classification of roads. Selection and factors affecting road alignment.

GEOMETRIC DESIGN OF HIGHWAY: Camber: Definition, purpose, types as per IRC – recommendations. • Kerbs: Road margin, road formation, right of way. Design speed and various factors affecting design speed as per IRC – recommendations. Gradient: Definition, types as per IRC – Recommendations. Sight distance (SSD): Definition, types IRC – recommendations,

simple numerical. Curves: Necessity, types: Horizontal, vertical curves. Extra widening of roads: numerical examples. Super elevation: Definition, formula for calculating minimum and maximum Super elevation and method of providing super-elevation. Standards cross-sections of national highway in embankment and cutting.

CONSTRUCTION OF ROAD PAVEMENTS: Types of road materials and their Tests – Test on aggregates-Flakiness and Elongation Index tests, Angularity Number test, test on Bitumenpenetration, Ductility, Flash and Fire point test and Softening point test. Pavement – Definition, Types, Structural Components of pavement and their functions Construction of WBM road. Merits and demerits of WBM & WMM road. Construction of Flexible pavement / Bituminous Road, Types of Bitumen and its properties, Emulsion, Cutback, Tar, Terms used in BR-prime coat, tack coat, seal coat, Merits and Demerits of BR. Cement concrete road -methods of construction, Alternate and Continuous Bay Method, Construction joints, filler and sealers, merits and demerits of concrete roads. Types of joints.

BASICS OF RAILWAY ENGINEERING: Classification of Indian Railways, zones of Indian Railways Permanent way: Ideal requirement, Components; Rail Gauge, types, factors affecting selection of a gauge. Rail, Rail Joints - requirements, types. Creep of rail: causes and prevention. Sleepers - functions and Requirement, types - concrete sleepers and their density Ballast - function and types, suitability. Rail fixtures and fastenings – fish plate, spikes, bolts, keys, bearing plates, chairs-types of anchors and anti-creepers.

TRACK GEOMETRICS, CONSTRUCTION AND MAINTENANCE: Alignment- Factors governing rail alignment. Track Cross sections – standard cross section of single and double line in cutting and embankment. Important terms-permanent land, formation width, side drains, Railway Track Geometrics: Gradient, curves- types and factors affecting, grade compensation, super elevation, limits of Super elevation on curves, cant deficiency, negative cant, coning of wheel, tilting of rail. Branching of Tracks, Points and crossings, Turn out- types, components, functions and inspection. Track junctions: crossovers, scissor cross over, diamond crossing, track triangle. Station -Purpose, requirement of railway station, important technical terms, types of railway station, factors affecting site selection for railway station. Station yard: Classification-Passenger, goods, locomotive and marshalling yards. Function & drawbacks of marshalling yards. Track Maintenance- Necessity, Classification, Tools required for track maintenance with their functions, Organisation of track maintenance, Duties of permanent way inspector, gang mate and key man.

E. TEXT BOOKS

- T1. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.
- T2. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.

B. REFERENCE BOOKS

- R1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., Delhi (ISBN: 978-93- 82609-858) Edition 2018
- R2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
- R3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.
- R4.Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.
- R5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg, Standard Book House, New Delhi.
- R6. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand Publication, New Delhi.

CO	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the types of roads as per IRC recommendations	3	3	3	2	3	1	1	1	-	3	2	-
[CO2]	Implement the geometrical design features of different highways.	3	3	3	2	2	2	1	1	-	2	2	-
[CO3]	Students will receive the introduction and history of highway engineering and economics also which will remain correct for long period of time.	2	3	-	-	1		-	-	-	-	2	2
[CO4]	Students will get the knowledge about the traffic engineering and components of traffic such as traffic signs, signals, design of traffic signals design, rotary intersection, Volume studies, speed studies etc.	1	2	-	-	3	-	-	-	-	2	1	3
[CO5]	D5] Students will examine and test materials of highway such as Soil, Stone Aggregate, Bitumen, Marshal Stability Test etc. Also get knowledge about construction of highway.		2	3	3	-	-	-	-	-	2	2	3

Subject: Concrete Technology

Code: DIP13015

3 Credits | Semester IV

A. INTRODUCTION:

- To know properties of cement, aggregate and water used in concrete.
- To understand different characteristics of concrete.
- To learn about role of admixtures in concrete.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Use different types of cement and aggregates in concrete

[CO2] Prepare concrete of desired compressive strength.

[CO3] Prepare concrete of required specification.

[CO4] Maintain quality of concrete under different conditions.

[CO5] Apply relevant admixtures for concreting.

C. ASSESSMENT PLAN:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS:

CEMENT, AGGREGATES AND WATER: Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength. Storage of cement and effect of storage on properties of cement. BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement. Aggregates: Requirements of good aggregate, Classification according to size and shape. Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand. Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion

value of coarse aggregates with specifications. Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.

CONCRETE: Concrete: Different grades of concrete, provisions of IS 456. Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456. Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures. Properties of Hardened concrete: Strength, Durability, Impermeability

QUALITY CONTROL OF CONCRETE: Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete. Forms for concreting: Different types of form works for beams, slabs, columns, materials used for formwork, requirement of good formwork. Stripping time for removal of form works per IS 456. Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for yaterproofing. Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints.

CHEMICAL ADMIXTURE, SPECIAL CONCRETE AND EXTREME WEATHER CONCRETING: Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water-reducing admixtures, air entraining admixtures and super plasticizers. Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self-compacting concrete and lightweight concrete. Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition.Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.

CONCRETE MIX DESIGN AND TESTING OF CONCRETE:Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262 (only procedural steps). Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results. Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests.

E. TEXT BOOKS

- T1. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
- T2. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
- T3. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

F. REFERENCE BOOKS

R1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.R2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.R3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES												
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	
[CO1]	Use different types of cement and aggregates in concrete	3	2	-	-	-	-	-	-	-	-	2	-	
[CO2]	Prepare concrete of desired compressive strength.	2	3	2	2	-	-	-	-	-	-	2	-	
[CO3]	Prepare concrete of required specification.	3	2	3	-	-	-	-	-	-	-	1	3	
[CO4]	Maintain quality of concrete under different conditions.	2	3	2	2	-	-	-	-	-	-	1	2	
[CO5]	Apply relevant admixtures for concreting.	2	2	2	2	-	-	-	-	-	-	1	2	

Subject: Precast & Prestressed Concrete

Code:DIP14204

3 Credits | Semester IV

A. INTRODUCTION:

- To introduce various types of precast and prefabricated concrete elements.
- To know advantages and disadvantages of precast and prefabricated concrete elements.
- To understand prestressing methods, systems for Reinforced Concrete members.
- To learn issues involved in design of prestressing system and loss of prestressing
- B. COURSE OUTCOMES: At the end of the course, students will be able to
- [CO1] Select the relevant precast concrete element for a given type of construction.
- [CO2] Use relevant components for prefabricated structures.
- **[CO3]** Justify the relevance of prestressed element in a given situation.
- [CO4] Select relevant methods / systems for given construction work.
- **[CO5]** Propose suitable cable profile for the given prestressed concrete members.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS:

PRECAST CONCRETE ELEMENTS:Advantages and disadvantages of precast concrete members. Non-structural Precast elements - Paver blocks, Fencing Poles, Transmission Poles, Manhole Covers, Hollow and Solid Blocks, kerb stones as per relevant BIS specifications Structural Precast elements – tunnel linings, Canal lining, Box culvert, bridge panels, foundation, sheet piles. Testing of Precast components as per BIS standards

PREFABRICATED BUILDING:Precast Structural Building components such as slab panels, beams, columns, footings, walls, lintels and chajjas, staircase elements. Prefabricated building using precast load bearing and non load bearing wall panels, floor systems - Material characteristics, Plans & Standard specifications Modular co-ordination, modular grid, and finishes Prefab systems and structural schemes and their classification including design

considerations Joints – requirements of structural joints and their design considerations Manufacturing, storage, curing, transportation and erection of above elements, equipment needed

INTRODUCTION TO PRESTRESSED CONCRETE:Principles of pre-stressed concrete and basic terminology. Applications, advantages and disadvantages of prestressed concrete Materials used and their properties, Necessity of high-grade materials Types of Pre-stressing steel -Wire, Cable, tendon, Merits-demerits and applications

METHODS AND SYSTEMS OF PRESTRESSING:Methods of prestressing – Internal and External pre-stressing, Pre and Post tensioning- applications Systems for pre tensioning – process, applications, merits and demerits - Hoyer system Systems for post-tensioning - process, applications, merits and demerits - Freyssinet system, Magnel Blaton system, Gifford Udall system. Prestressing force in Cable, Loss of prestress during the tensioning process - loss due to friction, length effect, wobbling effect and curvature effect, (Simple Numerical problems to determine loss of pre-stress), Loss of pre-stress at the anchoring stage. Loss of pre-stress occurring subsequently: losses due to shrinkage of concrete, creep of concrete, elastic shortening, and creep in steel, (Simple Numerical problems to determine loss of pre-stress). BIS recommendations for percentage loss in case of Pre and Post tensioning.

ANALYSIS AND DESIGN OF PRESTRESSED RECTANGULAR BEAM SECTION: Basic assumptions in analysis of pre-stressed concrete beams. Cable Profile in simply supported rectangular beam section – concentric, eccentric straight and parabolic Effect of cable profile on maximum stresses at mid span and at support. Numerical problems on determination of maximum stresses at mid spans with linear (concentric and eccentric) cable profiles only. Simple steps involved in Design of simply supported rectangular beam section (No numerical problems)

E. TEXT BOOKS

- T1. BIS, New Delhi. IS 12592 Precast Concrete Manhole Cover and Frame, BIS, New Delhi
- T2. BIS, New Delhi. IS 15658 Precast concrete blocks for paving Code of Practice, BIS, New Delhi
- T3. BIS, New Delhi. IS 15916 Building Design and Erection Using Prefabricated Concrete -Code of Practice, BIS, New Delhi
- T4. BIS, New Delhi. IS 15917 Building Design and Erection Using Mixed/Composite Construction Code of Practice, BIS, New Delhi
- T5. BIS, New Delhi. IS 458 Precast Concrete Pipes (with and without reinforcement) Specification, BIS, New Delhi

F. REFERENCE BOOKS

R1. Krishna Raju, N., Pre-stressed Concrete, Tata McGraw Hill, New Delhi.

- R2. Shrikant B. Vanakudre, Prestressed Concrete, Khanna Publishing House, New Delhi
- R3. Marzuki, Nor Ashikin, Pre Cast and Pre Stress Technology: Process, Method and Future Technology, Createspace Independent Publication.
- R4. Indian Concrete Institute., Handbook on Precast Concrete buildings.
- R5. Elliott, Kim S., Precast Concrete Structures, CRC Press, New York.
- R6. Lin, T.Y., Design of Pre-Stressed Concrete Structures, John Wiley and Sons, New York Nagarajan, Pravin., Pre-stressed Concrete Structures, Pearson Education India

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Select the relevant precast concrete element for a given type of construction.	3	2	-	-	-	-	-	-	-	2	3	1
[CO2]	Use relevant components for prefabricated structures.	2	3	1	2	-	-	-	-	-	2	3	2
[CO3]	Justify the relevance of prestressed element in a given situation.	3	2	1	-	-	-	-	-	-	3	2	-
[CO4]	Select relevant methods / systems for given construction work.	2	3	1	2	-	-	-	-	-	-	-	2
[CO5]	Propose suitable cable profile for the given prestressed concrete members.	2	2	1	-	-	-	-	-	-	-	3	-

Subject: Construction& project Management Code: DIP14186 3 Credits | Semester IV

A. INTRODUCTION:

- To understand the contract management and associated labor laws.
- To prepare and understand the principals involved in site layout.
- To know the procedure for scheduling of various activates in construction project.
- To understand the labor laws, procedure for arbitration, settlements.
- To know different safety measures in construction projects.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- **[C01]** Understand the contract management and associated labour laws.
- **[CO2]** Prepare and understand the nuances of executing the site layout
- [CO3] Prepare networks and bar charts for the given construction project.
- [CO4] Understand the intricacies of disputes, related arbitration and settlement laws.

[CO5] Apply safety measures at construction projects.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS:

CONSTRUCTION INDUSTRY AND MANAGEMENT: Organization-objectives, principles of organization, types of organization: government/public and private construction industry, Role of various personnel in construction organization Agencies associated with construction work- owner, promoter, builder, designer, architects. Role of consultant for various activities: Preparation of Detailed Project Report (DPR), monitoring of progress and quality, settlement of disputes.

SITE LAYOUT: Principles governing site layout. Factors affecting site layout. Preparation of site layout. Land acquisition procedures and providing compensation.

PLANNING AND SCHEDULING:Identifying broad activities in construction work & allotting time to it, Methods of Scheduling, Development of bar charts, Merits & limitations of bar chart. Elements of Network: Event, activity, dummy activities, Precautions in drawing Network, Numbering the events.

CPM networks, activity time estimate, Event Times by forward & backward pass calculation, start and finish time of activity, project duration. Floats: Types of Floats-Free, independent and total floats, critical activities and critical path, Purpose of crashing a network, Normal Time and Cost, Crash Time and Cost, Cost slope, Optimization of cost and duration. Material Management- Ordering cost, inventory carrying cost, Economic Order Quantity Store management, various records related to store management, inventory control by ABC technique, Introduction to material procurement through portals (e.g. www.inampro.nic.in)

CONSTRUCTION CONTRACTS AND SPECIFICATIONS: Types of Construction contracts Contract documents, specifications, general special conditions Contract Management, procedures involved in arbitration and settlement (Introduction only)

SAFETY IN CONSTRUCTION: Safety in Construction Industry—Causes of Accidents, Remedial and Preventive Measures. Labor Laws and Acts pertaining to civil construction activities (Introduction only)

E. TEXT BOOKS

- T1. Khanna, O.P., Industrial Engineering and management, Dhanpat Rai New Delhi
- T2. Punmia, B.C. and Khandelwal, K.K., Project Planning and Controlling with PERT And CPM, Laxmi Publications (P)Ltd.
- T3. Sengupta, B., Guha H., Construction Management and Planning, Tata-McGraw Hill.
- T4. Harpal, Singh, Construction Management and accounts, Mc-Graw Hill.
- T5. Sharma, S.C., Industrial Engineering and Management, Khanna Publications, New Delhi

F. REFERENCE BOOKS

- R1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi
- R2. Gahlot,P.S. and Dhir, B.M Construction planning and management New Age International (P) Ltd. Publishers, New Delhi.
- R3. Shrivastava, U.K., Construction planning and management, Galgotia Publication Pvt Ltd. New Delhi
- R4. Mantri, S., The A To Z of Practical Building Construction and its Management, Satya Prakashan New Delhi

СО	STATEMENT	COF	RREL	ATION	N WIT	'H PR	OGRA	AM SP	PECIF	IC OU	UTCO	MES	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the contract management and associated labour laws.	1	1	-	-	1	-	1	-	-	1	-	2
[CO2]	Prepare and understand the nuances of executing the site layout	1	2	2	-	-	-	-	-	-	-	2	1
[CO3]	Prepare networks and bar charts for the given construction project.	2	3	1	-	-	-	-	-	-	1	2	3
[CO4]	Understand the intricacies of disputes, related arbitration and settlement laws.	2	1	-	-	2	-	1	-	-	-	-	2
[CO5]	Apply safety measures at construction projects.	1	3	1	-	1	-	-	-	-	-	2	2

Subject: Rural Construction Technology

Code: DIP14205

3 Credits | Semester IV

A. INTRODUCTION:

- To learn development and planning of low cost housing infrastructure.
- To know about different government schemes for rural development.
- To understand techniques for rural road construction as per IRC stipulations.
- To learn rural irrigation techniques and watershed management

B. COURSE OUTCOMES: At the end of the course, students will be able to

[C01] Plan low cost housing using rural materials.

- [CO2] Make use of relevant government schemes for construction of roads and housing
- **[CO3]** Use guidelines for rural road construction.
- **[CO4]** Implement different construction systems for rural areas.

[CO5] Identify the need of watershed management in rural areas.

C. ASSESSMENT PLAN:

Criteria		Description	Maximum Marks				
Continuous	Internal	Internal Examination	20				
Assessment (CIA)		Attendance	5				
		Assignment	5				
End	Semester	End Semester Examination	70				
Examination(ESE)							
Total			100				
Attendance		A minimum of 75% Attendance is required to be maintained by a					
		student to be qualified for taking up the End Semester examination.					
		The allowance of 25% includes all types of leaves including medical					
		leaves.					

D. SYLLABUS:

RURAL DEVELOPMENT AND PLANNING: Scope; development plans; various approaches to rural development planning. Significance of rural development. Rural development programme /projects

RURAL HOUSING: Low cost construction material for housing Composite material- ferro-cement & fly ash, autoclaved calcium silicate bricks and soil-stabilized un-burnt brick; Plinth protection of mud walls. Waterproof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry, rattrap bond for walls; Panels for roof, ferro-cement flooring/roofing units. Biomass - types of fuels such as firewood, agricultural residues, dung cakes. Renewable energy and integrated rural energy program - Objectives, Key elements, Implementation, Financial provisions, sources of renewable energy. Working of gobar gas and bio gas plants.

WATER SUPPLY AND SANITATION FOR RURAL AREAS: Sources of water: BIS & WHO water standards. Quality, Storage and distribution for rural water supply works Hand pumps-types, installation, operation, and maintenance of hand pumps. Conservation of water - rainwater harvesting, drainage in

rural areas. Construction of low cost latrines: Two pit pour flush water seal, septic tank etc. Low cost community and individual Garbage disposal systems, Ferro-cement storage tanks.

LOW COST RURAL ROADS: Broad categories of Pavement Layers, types of Granular Sub-Bases and Bases. Guidelines for Surfacing of Rural Road as per relevant IRC codes. Pradhan Mantri Gram Sadak Yojna (PMGSY)- Highlights of Scheme

LOW COST IRRIGATION: Design consideration and construction of tube-well, drip & sprinkler irrigation systems. Watershed and catchment area development –problems and features of watershed management. Watershed management structures - K. T. weir, Gabian Structure, Cement Plug, Contour Bunding, Farm pond, Bandhara system.

E. Text Book:

- T1. Singh, Katar, Rural Development Principles, Policies and Management, Sage Publications India Pvt Ltd.
- T2. Document Published by Ministry of Rural development, Govt. of India, Ministry of Rural development.

F. Reference Books:

- R1. Madhov Rao A G, and Ramachandra Murthy, D S, Appropriate Technologies for low cost Housing Oxford and IBH Publishing Co. Pvt. Ltd.
- R2. CBRI, Roorkee, Advances in Building Materials and Constriction.
- R3. Desai, Vasant, Rural Development in India: Past, Present and Future : a Challenge in the Crisis, Himalaya Publishing House, Delhi.
- R4. Rastogi, A.K.Rural Development Strategy, Wide Vision, Jaipur.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Plan low cost housing using rural materials.	2	2	1	-	1	-	-	-	-	-	1	3
[CO2]	Make use of relevant government schemes for construction of roads and housing	2	3	2	-	2	-	-	-	-	1	1	3
[CO3]	Use guidelines for rural road construction.	2	3	-	-	2	-	-	-	-	1	1	3
[CO4]	Implement different construction systems for rural areas.	2	3	2	1	1	-	-	-	-	1	3	1
[CO5]	Identify the need of watershed management in rural areas.	2	3	2	1	1	-	-	-	-	-	3	1

Subject: Concrete Technology Lab Code: DIP13020 1Credits | Semester IV

A. INTRODUCTION:

- To know properties of cement, aggregate and water used in concrete.
- To understand different characteristics of concrete.
- To learn about role of admixtures in concrete.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Identify different types of cement by performing laboratory tests.

- **[CO2]** Know the physical properties of fine and coarse aggregates.
- **[CO3]** Prepare concrete of required specification.
- **[CO4]** Maintain quality of concrete under different conditions.
- **[CO5]** Apply relevant admixtures for concreting.

C. Assessment Plan:

Criteria	Description	Maximum Marks						
Continuous Internal	Internal Examination	5						
Assessment (CIA)	Attendance	5						
	Assignment	5						
End Semester	End Semester Examination	35						
Examination(ESE)								
Total		50						
Attendance	A minimum of 75% Attendance is required to be maintained by							
	a student to be qualified for taking up the End Semester							
	examination. The allowance of 25% includes all types of leaves							
	including medical leaves.							

D. SYLLABUS

Sl.No	Name of Practical
1	Determine fineness of cement by Blaine's air permeability apparatus Or by sieving.
2	Determine specific gravity, standard consistency, initial and final setting times of cement.
3	Determine compressive strength of cement.
4	Determine silt content in sand.
5	Determine bulking of sand.
6	Determine bulk density of fine and coarse aggregates.
7	Determine water absorption of fine and coarse aggregates.
8	Determine Fineness modulus of fine aggregate by sieve analysis.

9	Determine impact value of aggregate
10	Determine crushing value of aggregate.
11	Determine abrasion value of aggregate.
12	Determine elongation and flakiness index of coarse aggregates
13	Determine workability of concrete by slump cone test.
14	Determine workability of concrete by compaction factor test.
15	To prepare concrete mix of a particular grade and determine compressive strength of
	concrete for 7 and 28 days.
16	Demonstration of NDT equipment.

E. TEXT BOOKS

T1. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.

- T2. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
- T3. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

F. REFERENCE BOOKS

- R1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
- R2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
- R3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify different types of cement by performing laboratory tests.	1	2	3	3	-	-	-	-	-	1	2	-
[CO2]	Know the physical properties of fine and coarse aggregates.	1	3	2	2	-	-	-	-	-	1	2	-
[CO3]	Prepare concrete of required specification.	1	2	3	2	-	-	-	-	-	-	1	3
[CO4]	Maintain quality of concrete under different conditions.	2	3	2	2	-	-	-	-	-	1	1	2
[CO5]	Apply relevant admixtures for concreting.	2	2	2	2	-	-	-	-	-	1	1	2

Subject: Hydraulics Lab

Code: DIP14193

1 Credits | Semester IV

A. INTRODUCTION:

- To understand parameters associated with fluid flow and hydrostatic pressure.
- To know head loss and water hammer in fluid flowing through pipes.
- To learn different types of pumps and their uses.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Measure pressure and determine total hydrostatic pressure for different conditions.

- [CO2] Understand various parameters associated with fluid flow.
- **[CO3]** Determine head loss of fluid flow through pipes.
- [CO4] Find the fluid flow parameters in open channels.
- **[C05]** Select relevant hydraulic pumps for different applications..

C. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

D. SYLLABUS

Sl.No	Name of Practical
1	Use piezometer to measure pressure at a given point.
2	Use Bourdon's Gauge to measure pressure at a given point
3	Use U tube differential manometer to measure pressure difference between two given points.
4	Find the resultant pressure and its position for given situation of liquid in a tank.
5	Use Reynold's apparatus to determine type of flow
6	Use Bernoulli's apparatus to apply Bernoulli's theorem to get total energy line for a flow

	in a closed conduit of varying cross sections.
7	Use Friction factor Apparatus to determine friction factor for a given pipe.
8	Determine minor losses in pipe fittings due to sudden contraction and sudden enlargement.
9	Determine minor losses in pipe fitting due to Bend and Elbow.
10	Calibrate Venturi meter to find out the discharge in a pipe.
11	Calibrate the Orifice to find out the discharge through a tank
12	Use Current meter to measure the velocity of flow of water in open channel.
13	Use Pitot tube to measure the velocity of flow of water in open channel.
14	Use triangular notch to measure the discharge through open channel
15	Use Rectangular notch to measure the discharge through open channel.
16	Determine the efficiency of centrifugal pump.

E. TEXT BOOKS

- T1. Modi, P. N.and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
- T2. S.S. Rattan, Fluid Mechanics & Hydraulic Machines, Khanna Book Publishing Co., New Delhi
- T3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.
- T4. Khurmi R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S. Chand Publishers

F. REFERENCE BOOKS

R1. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.

R2. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University Press, New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Measure pressure and determine total hydrostatic pressure for different conditions.	1	2	3	3	-	-	-	-	-	-	2	-
[CO2]	Understand various parameters associated with fluid flow.	1	3	2	2	-	-	-	-	-	-	3	-
[CO3]	Determine head loss of fluid flow through pipes.	1	2	3	2	-	-	-	-	-	-	2	2
[CO4]	Find the fluid flow parameters in open channels.	2	3	2	2	-	-	-	-	-	-	1	1
[CO5]	Select relevant hydraulic pumps for different applications.	2	2	2	2	-	-	-	-	-	-	2	1

Subject: Advanced Surveying Lab

Code:DIP14028

1 Credits | Semester IV

A. INTRODUCTION:

- To know methods of plane surveying and Thredolite surveying and their uses
- To learn tacheometric surveying and curve setting
- To understand the principles of Electronic Distance Measurement equipment and Total station and their use.
- To know the concept of remote sensing, GPS and GIS

B. COURSE OUTCOMES: At the end of the course, students will be able to

- **[CO1]** Prepare plans using Plane Table Surveys.
- **[CO2]** Prepare plans using Theodolite surveys.
- **[CO3]** Find distances and elevations using Tachometer.
- [CO4] Prepare plans using Total Station instrument.
- **[C05]** Locate coordinates of stations using GPS.

C. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

D. SYLLABUS

Sl.No	Name of Practical
1	Use plane table survey to prepare plans of a plot of seven sided closed traverse by Radiation Method
2	Use plane table survey to prepare plans, locate details by Intersection Method
3	Use plane table survey to prepare plans, locate details by Traversing Method
4	Use plane table survey to carry out Survey Project for closed traverse for minimum five sides around a building

5	Use transit theodolite to measure Horizontal and Vertical angle by Direct Method
6	Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Theodolite Survey Project.
7	Use Thedolite as a Tacheometer to compute reduced levels and horizontal distances.
8	Set out a circular curve by Rankine's Method of Deflection Angles.
9	Use of digital clinometer to compute the area of a polygon/ irregular plot.
10	Use EDM to measure horizontal distance
11	Use Total station instrument to measure horizontal distances.
12	Use Total station instrument to measure vertical angle.
13	Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides.
14	Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Total Station Survey Project
15	Use GPS to locate the coordinates of a station.
16	Use micro optic Theodolite to Measure Horizontal angle by Direct Method.

E. TEXT BOOKS

- T1. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education, Noida.
- T2. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

F. REFERENCE BOOKS

- R1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
- R2. Basak, N. N., Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd., Noida.
- R3. Duggal, S. K., Survey Survey II, Tata McGraw Hill Education Pvt. Ltd. and Noida, I.
- R4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Prepare plans using Plane Table Surveys.	2	2	3	3	-	-	-	-	-	-	2	-
[CO2]	Prepare plans using Theodolite surveys.	1	3	2	2	-	-	-	-	-	-	3	-
[CO3]	Find distances and elevations using Tachometer.	2	2	3	2	-	-	-	-	-	-	2	2
[CO4]	Prepare plans using Total Station instrument.	2	3	2	2	-	-	-	-	-	-	1	1
[CO5]	Locate coordinates of stations using GPS.	2	2	2	2	-	-	-	-	-	-	2	1

Subject: Transportation Engineering Lab

Code: DIP14211

1 Credits | Semester IV

A. INTRODUCTION:

- To know properties of cement, aggregate and water used in concrete.
- To understand different characteristics of concrete.
- To learn about role of admixtures in concrete.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Identify different types of cement by performing laboratory tests.

- **[CO2]** Know the physical properties of fine and coarse aggregates.
- **[CO3]** Prepare concrete of required specification.
- **[CO4]** Maintain quality of concrete under different conditions.
- [CO5] Apply relevant admixtures for concreting

C. Assessment Plan:

Criteria	Description	Maximum Marks							
Continuous Internal	Internal Examination	5							
Assessment (CIA)	Attendance	5							
	Assignment	5							
End Semester	End Semester Examination	35							
Examination(ESE)									
Total		50							
Attendance	A minimum of 75% Attendance is required to be maintained by								
	a student to be qualified for taking up the End Semester								
	examination. The allowance of 25% includes all types of leaves								
	including medical leaves.								

D. SYLLABUS

Sl.No	Name of Practical
1	Draw the sketches showing standard cross sections of Expressways, Freeways, NH/SH,
	MDR/ODR
2	Flakiness and Elongation Index of aggregates
3	Angularity Number of aggregates.
4	Aggregate impact test
5	Los Angeles Abrasion test
6	Aggregate crushing test
7	Softening point test of bitumen.
8	Penetration test of bitumen.

9	Flash and Fire Point test of bitumen.
10	Ductility test of Bitumen.
11	Visit the constructed road for visual inspection to identify defects and suggest remedial
	measures.
12	Prepare the photographic report containing details for experiment No. 11.
13	Prepare the photographic report containing details for experiment No. 13
14	Visit the road of any one type (flexible or rigid) to know the drainage condition.
15	Prepare the photographic report suggesting possible repairs and maintenance for
	experiment No. 15.
16	Visit to railway track for visual inspection of fixtures, fasteners and yards
17	Prepare the photographic report containing details for experiment No. 17

E. TEXT BOOKS

- T1. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.
- T2. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.

F.REFERENCE BOOKS

- R1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., Delhi (ISBN: 978-93- 82609-858) Edition 2018
- R2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
- R3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify different types of cement by performing laboratory tests.	1	2	3	3	-	-	-	-	-	-	3	-
[CO2]	Know the physical properties of fine and coarse aggregates.	1	3	2	-	2	1	-	-	-	-	3	-
[CO3]	Prepare concrete of required specification.	1	2	3	-	-	-	-	-	-	-	2	2
[CO4]	Maintain quality of concrete under different conditions.	2	3	2	-	-	-	-	-	-	-	3	1
[CO5]	Apply relevant admixtures for concreting	2	2	2	2	1	1	-	-	-	-	2	1
Subject: Building Planning & Drawing Lab

Code: DIP14183

1 Credits | Semester IV

A. INTRODUCTION:

- To learn the basic principles of building planning and drawing.
- To make graphical representation of various components of buildings.
- To draw complete plan and elevation of a building.
- To learn basics of perspective drawings and Computer Aided Drawings.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Interpret the symbols, signs and conventions from the given drawing.

[CO2] Prepare line plans of residential and public buildings using principles of planning.

[CO3] Prepare working drawing for the given requirement of Load Bearing Structure.

[CO4] Prepare working drawing using CAD for the given requirement of Framed Structure.

[CO5] Draw two-point perspective drawing for given small objects

C. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal	Internal Examination	5
Assessment (CIA)	Attendance	5
	Assignment	5
End Semester	End Semester Examination	35
Examination(ESE)		
Total		50
Attendance	A minimum of 75% Attendance	is required to be maintained by
	a student to be qualified for taki	ng up the End Semester
	examination. The allowance of 2	25% includes all types of leaves
	including medical leaves.	

D. SYLLABUS

Sl.No	Name of Practical
	A. SKETCH BOOK
1	Draw various types of lines, graphical symbols for materials, doors and windows,
	symbols for sanitary, water supply and electrical installations and write abbreviations as
	per IS 962.
2	Write summary of observations of all technical details from the given drawing (One/Two
	BHK) obtained from the professional architect or civil engineer (Group activity in four
	students)
3	a) Measure the units of existing building (Load Bearing / Frame structure).
	b) Draw line plan of measured existing building at serial no 3a to the suitable scale.

	Draw line plan to suitable scale (Minimum 1BHK, staircase, WC and Bathroom)
4	a) Residential Bunglows (Minimum three plans)
	b) Apartment (Minimum two plans)
	Draw line plans to suitable scale for any Five Public Buildings from the following
5	(School Building, Primary Health Centre, Bank, Post Office, Hostel, Restaurant,
	Community Hall and Library).
	Draw the following plans for a Framed Structure (One/Two BHK) from given line plan.
	a.Developed plan, Elevation
6	b. Section for above developed plan.
_	c. Site plan for above drawings including area statement, schedule of opening and
	construction notes.
	B. FULL IMPERIAL SIZE SHEET (A1)
	Draw submission drawing to the scale 1:100 of a single storey load bearing residential
	building (2BHK) with flat Roof and staircase showing:
1	a)Developed plan and elevation
-	b) Section passing through Stair or W.C. and Bath
	c) Foundation plan and schedule of openings.
	d) Site plan (1:200), area statement, construction notes.
	Draw submission drawing, to the scale of 1:100, of (G+1) Framed Structure Residential
2	Building (2BHK) with Flat Roof and staircase showing:
	a) Developed plan .
	b) Elevation.
	c) Section passing through Staircase, WC and Bath
	a) Site plan (1:200) and area statement
	e) Schedule of openings and Construction Notes.
	Draw the above mentioned drawing at serial number (B-2) using CAD software and
	a) Developed plan
	b) Elevation
3	c) Section passing through Staircase WC and Bath
	d) Foundation plan .
	e) Site plan (1:200), area statement, Schedule of openings and construction notes
	Draw working drawing for above mentioned drawing at serial number (B-2) showing:
	a)Foundation plan to the scale 1:50
4	b) Detailed enlarged section of RCC column and footing with plinth filling.
	c) Detailed enlarged section of RCC Beam, Lintel and Chajjas.
	d) Detailed enlarged section of RCC staircase and slab.
	Draw two point perspective drawing of small objects - steps, monuments, pedestals (any
5	one) scale 1:50
	a)Draw plan, elevation, eye level, picture plane and vanishing points
	b) Draw perspective view.

D. Text Book:

T1. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.

T2. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.

T3. Singh, Ajit, Working with Auto CAD 2000, Mcgraw Hill Publishing company Ltd.

T4. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

E. Reference Books:

R1.Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing

R2. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd

R3. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill

R4. Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, Charotar Publication, Anand.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	RRELA	ATION	N WIT	'H PR	OGRA	AM SP	PECIF	IC OU	JTCO	MES	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Interpret the symbols, signs and conventions from the given drawing.	2	2	3	-	-	-	-	-	-	-	2	-
[CO2]	Prepare line plans of residential and public buildings using principles of planning.	2	3	2	-	-	-	-	-	-	-	3	-
[CO3]	Prepare working drawing for the given requirement of Load Bearing Structure.	1	2	3	-	-	-	-	-	-	-	2	2
[CO4]	Prepare working drawing using CAD for the given requirement of Framed Structure.	2	3	2	1	-	-	-	-	-	-	1	1
[CO5]	Draw two-point perspective drawing for given small objects	2	2	2	1	-	-	-	-	-	-	2	1

Subject: Minor Project Code: DIP14203 2 Credits | Semester IV

A. Introduction: The objective of this course is to prepare students to use applications of the theory and practical learned during the course. It will also help students to develop an industry or research oriented project. This course helps students how to carry out project/studies in the field of interest of the student or as given by the industry.

B. Assessment Plan:

Criteria	Description	Maximum Marks
Continuous Internal	Internal Examination	15
Assessment (CIA)	Attendance	
	Assignment	
End Semester	End Semester Examination	35
Examination(ESE)		
Total		50
Attendance	A minimum of 75% Attendance	is required to be maintained by
	a student to be qualified for taki	ng up the End Semester
	examination. The allowance of 2	25% includes all types of leaves
	including medical leaves.	

G ARKA JAIN University Jharkhand

Syllabus of Diploma in Civil Engineering Semester-V

ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(**Group-B**)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47.5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20	5	5
2	Advanced Surveying	PCC	3	3	100	70	20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5
	Elective-II								
	Traffic Engineering								
3	Solid Waste Management	PEC	3	3	100	70	20	5	5
	Advanced Construction Technology								
	Elective-III Pavement Design & maintenance								
4	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5
	Building Services and Maintenance								
5	Open Elective-I Engineering Economics & Accountancy Renewable Energy Technologies	OEC	3	3	100	70	20	5	5
	Numerical Methods								
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5
	Practical								
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0
	TOTAL		24	24	900	630	190	40	40

Project to be carried over to next semester

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance	
1	Public Health Engineering	HSMC	3	3	100	70	20	5	5	
	Elective-IV									
	Repairs and Maintenance of Structures									
2	Advanced Design of Structures	PEC	3	3	100	70	20	5	5	
	Tendering and Accounts									
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5	
	Open Elective-II									
	Project Management									
4	Disaster Management	OEC	3	3	100	70	20	5	5	
	Operations Research									
	Open Elective-III									
	Sustainable Development	OEC								
5	Artificial Intelligence		3	3	100	70	20	5	5	
	History of Science and Engineering									
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5	
	Practical									
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5	
7	Seminar	PROJ	1	2	50	35	5	5	5	
8	Major Project-II	PROJ	3	0	100	100	0	0	0	
	TOTAL		21	20	700	520	110	35	35	

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	18
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	47
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	6	12
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
	Total	58	124

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card. The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

Subject: Design of Steel & RCC Structure

Code:

3 Credits | Semester V

A. INTRODUCTION:

- To learn the concept of limit state design for tension and compression steel members.
- To learn the concept of limit state design of steel beams.
- To understand design of RCC elements.
- To know the design of short and long RCC columns.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Understand design principles governing Steel and Reinforced Concrete Sections.
- [CO2] Apply the provisions of IS 456 and IS 800.
- [CO3] Analyze Steel I and Channel Sections and Reinforced Concrete Beam, Column and Shear Sections.
- [CO4] Select the most appropriate or economic section under a given condition of load and supports.
- [CO5] Design Steel and Reinforced Concrete sections.

Criteria		Description	Maximum Marks							
Continuous	Internal	20								
Assessment (CIA)		Attendance	5							
		Assignment	5							
End	Semester	End Semester Examination	70							
Examination(ESE)										
Total			100							
Attendance		A minimum of 75% Attendance	is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.								
		The allowance of 25% includes all types of leaves including medical								
		leaves.								

C. ASSESSMENT PLAN:

D. SYLLABUS

DESIGN OF STEEL TENSION & COMPRESSION MEMBERS (LIMIT STATE METHOD): Types of sections used for Tension members. Strength of tension member by-yielding, rupture of net cross-section and blockshear. Design of axially loaded single angle and double angle tension members with bolted and welded connections. Types of sections used as compression member, Calculation of effective length, Radius ofgyration and slenderness ratio, Permissible values of slenderness ratio as per IS 800, Design compressive stress.Introduction to built up sections, lacing and battening (Meaning and purpose), Diagrams of single and double lacing and battening system. (No numerical problems). Design of axially loaded single and double angle struts connected by bolted and welded connections with gusset plate.

DESIGN OF STEEL BEAMS (LIMIT STATE METHOD): Standard beam sections, bending stress calculations. Design of simple I and channel section. Check for shear as per IS 800.

DESIGN OF REINFORCED CONCRETE BEAMS BY LIMIT STATE METHOD: Concept of Limit state, Stress block diagram, Introduction to singly and doubly reinforced sections, IS 456,Design of singly reinforced beam, concept of under reinforced, over reinforced and balanced section, Simple numerical problem on ultimate moment of resistance and design of beam section Design of doubly reinforced sections, stress and strain diagrams, depth of neutral axis, simple numerical problems on ultimate moment of resistance of reinforced beam, Calculation of Ast and Asc.

SHEAR, BOND AND DEVELOPMENT LENGTH IN DESIGN OF RCC MEMBER: Nominal shear stress in RCC section, Design shear strength of concrete, Design of shear reinforcement, Minimum Shear Reinforcement, Provisions of IS 456, forms of shear reinforcement, Simple numerical on: Shear reinforcement, Adequacy of section for shear.Types of bond, Bond stress, check for bond stress, Determination of Development length in tension and compression members and check as per codal provisions, Anchorage value of 900 hook, Lapping of bars. Introduction to serviceability limit state check

DESIGN OF AXIALLY LOADED RCC COLUMN: Definition and classification of column, Limit state of compression members, Effective length of column. Provisions of IS 456 for minimum steel, cover, maximum steel, spacing of ties etc.Design of axially loaded short column - Square, Rectangular, and Circular only.

E. TEXT BOOKS

- T1. N. Subramanian, Design of Steel Structures, Oxford University Press
- T2. K.S.Sairam, Design of Steel Structures, Pearson Publication, Chennai, Delhi
- T3. S.U.Pillai & Devdas Menon, Reinforced concrete Design, McGraw Hill Publications, New Delhi.

F. REFERENCE BOOKS

R1. N.Krishna Raju, & R. N. Pranesh, Reinforced Concrete Design Principles and Practice, New Age International, Mumbai

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand design principles governing Steel and Reinforced Concrete Sections.	2	3	2	2	1	1	-	1	-	1	2	1
[CO2]	Apply the provisions of IS 456 and IS 800.	2	3	1	-	-	2	-	1	-	2	3	1
[CO3]	CO3] Analyse Steel I and Channel Sections and Reinforced Concrete Beam, Column and Shear Sections.			-	1	-	-	-	-	-	1	3	-
[CO4]	CO4] Select the most appropriate or economic section under a given condition of load and supports.			-	2	1	1	-	-	-	2	2	1
[CO5]	Design Steel and Reinforced Concrete sections.	1	3	1	-	1	1	-	-	-	1	2	-

Subject: Estimation Costing & Valuation

Code: 3 Credits | Semester V

A. INTRODUCTION:

• This is a core technology subject, which will enable the students to learn core facts, concepts, principles & procedures in Estimating & Costing. With this knowledge and skill, he will be able to prepare estimate before start of construction and systematically procure materials during execution using specifications for ensuring appropriate type of construction processes & quality of engineering products in specialized areas in Building Construction, Irrigation, Transportation and Environmental Engineering.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- **[CO1]** Recall the fundamentals of estimation and costing.
- **[CO2]** Prepare checklist of items of construction and rate analysis.
- [CO3] Compare actual quantity with estimated quantity.
- [CO4] Select modes of measurement for different items of work.
- **[C05]** Develop a detailed estimate for civil engineering work.

Criteria		Description	Maximum Marks							
Continuous	Internal	Internal Examination	20							
Assessment (CIA)		Attendance	5							
		Assignment	5							
End	Semester	End Semester Examination	70							
Examination(ESE)										
Total			100							
Attendance		A minimum of 75% Attendance	is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.								
		The allowance of 25% includes all types of leaves including medical								
		leaves.								

C. ASSESSMENT PLAN:

D. SYLLABUS

FUNDAMENTALS OF ESTIMATION & COSTING: Estimating and costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision. Roles and responsibility of Estimator.Types of estimates – Approximate and Detailed estimate.Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.Checklist of items in load bearing and framed structure. Standard formats of Measurement sheet, Abstract sheet, Face sheet. Modes of measurement and desired accuracy in measurements for different items of work as per IS:1200. Rules for deduction in different

category of work as per IS:1200.Description / specification of items of building work as per PWD /DSR.

APPROXIMATE ESTIMATES: Approximate estimate- Definition, Purpose. Methods of approximate estimate - Plinth area rate method, Approximate quantity method (with simple numerical) Approximate estimate for roads, culverts.

DETAILED ESTIMATE: Detailed Estimate- Definition and Purpose, Data required for detailed estimate, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting. Long wall and Short wall method, Centre line method.Bar bending schedule for footing, column, beam and slab elementsProvisions in detailed estimate: contingencies, work charged establishment, water supply and sanitary Charges and electrification charges etc. Prime cost, Bill of quantities,

ESTIMATES FOR CIVIL ENGINEERING WORKS: Earthwork - Quantities for roads, Embankment by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method. Detailed estimate for septic tank, Community well.

RATE ANALYSIS: Rate Analysis: Definition, purpose and importance. Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,Procedure for rate analysis.Task work- Definition, types. Task work of different skilled labour for different items. Categories of labours, their daily wages, types and number of labours for different items of workTransportation charges of materials - Lead and Lift, Hire charges of machineries and equipments. Preparing rate analysis of different items of work pertaining to buildings and roads.

E. TEXT BOOKS

T1. Estimating&costinginCivil Engineering, B.N.Datta, UBSPublishersDistributors PvtLtd NewDelhi
T2. Estimating&costing, SpecificationandValuationin CivilEngineering, M.Chakraborti, M.Chakraborti,Calcutta
T3. CivilEngineeringEstimating, ContractsandaccountsVol.I, B.S.Patil, OrientLongman,Mumbai

A. REFERENCE BOOKS

R1. Estimating&costing, S.C.Rangwala, CharotarPublicationAnand R2. Estimating&costing, G. S.Birdie, DhanpatRaiandSonsDelhi

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES							MES				
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Recall the fundamentals of estimation and costing.	-	2	-	-	2	-	3	2	-	1	3	2
[CO2]	Prepare checklist of items of construction and rate analysis.	-	2	-	-	2	-	3	2	1	-	3	3
[CO3]	Compare actual quantity with estimated quantity.	-	2	-	-	3	-	1	2	-	2	3	3
[CO4]	Select modes of measurement for different items of work.	1	2	-	1	2	-	-	1	-	1	3	3
[CO5]	Develop a detailed estimate for civil engineering work.	-	3	1	-	3	1	2	2	1	1	3	3

G. Course Articulation Matrix: (Mapping of COs with POs)

Subject: Traffic Engineering

Code:DIP15247

3 Credits | Semester V

A. INTRODUCTION:

- To understand the issues involved in traffic flow.
- To know and understand the tools for traffic studies.
- To delineate various traffic control measures.
- To understand measures for preventing accidents.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Identify the intersection depending on the traffic flow.
- [CO2] Use relevant road traffic signs, signal and markings.
- [CO3] Analyze road traffic characteristics.
- [CO4] Suggest preventive measures to avoid accidents by analyzing the traffic conditions at site.
- [CO5] Undertake various types of road traffic studies.

C. ASSESSMENT PLA	N:
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Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medical							
		leaves.							

D. SYLLABUS

FUNDAMENTALS OF TRAFFIC ENGINEERING: Traffic engineering- Definition, Relationship between speed, volume and density of traffic, Road user's characteristics-physical, mental, emotional factors. Vehicular characteristics-width, length, height, weight, speed, efficiency of breaks. Road characteristics - gradient, curve, design speed, friction between road and tyre surface.Reaction time - factors affecting reaction time. PIEV Theory

TRAFFIC STUDIES: Traffic volume count data- representation and analysis. Origin and Destination study, Speed studies - Spot speed studies. Need and method of parking study.

ROAD SIGNS & TRAFFIC MARKINGS: Traffic control devices –definition, necessity, types. Road signs - definition, objects of road signs. Mandatory or Regulatory, Cautionary or warning, informatory signs, Location of cautionary or warning sign in urban and non-urban

areasTraffic markings- definition, classification, carriage way, kerb, object marking and reflector markers

TRAFFIC SIGNALS & TRAFFIC ISLANDS: Traffic signals- Definition, Types, pedestrian signals. Types of traffic control signals - Fixed time, manually operated, traffic actuated signals and location of signals. Compute signal time by fix time cycle, Webster's and IRC methodTraffic islands –Definition, advantages and disadvantages. Types - rotary or central, channelizing or Refuge Island. Road intersections or junctions - Definition, Types.Intersection at grade- Types, basic requirements , Grade separated intersection- advantages and disadvantages, types - flyovers-partial and full Cloverleaf pattern, Diamond intersection, , underpass.

ROAD ACCIDENT STUDIES & ARBORICULTURE: Road Accidents-Definition, types and causes for collision and non-collision accidents. Measures to prevent road accidents. Collision and condition diagram.Street lighting –definition, necessity, types-luminaire, and foot candle, lumen, factors affecting their utilization and maintenance. Arboriculture- definition, objectives, factors affecting selection of type of trees. Maintenance of trees-protection and care of roadside trees.

E. TEXT BOOKS

T1. Traffic planning and design, S.C. Saxena, Dhanpat Rai & Sons Delhi

T2. Introduction to Traffic Engineering, R.S. Kumar, University Press (India), Pvt. Ltd T3. Highway Engineering, S.K. Khanna, C E G Justo , and A Veeraragavan, Nem Chand and Brothers, Roorkee.

F. REFERENCE BOOKS

R1. Transportation Engineering, L.R. Kadiyali, Khanna Book Publishing Co., Delhi

R2. Transportation Engineering Vol. I & II, V.N. Vazirani, , S.P. Chaondola, Khanna Publishers. Delhi.

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the intersection depending on the traffic flow.	-	3	-	-	2	-	-	-	-	2	2	-
[CO2]	Use relevant road traffic signs, signal and markings.	-	2	1	-	2	-	-	2	3	3	2	-
[CO3]	Analyse road traffic characteristics.	-	3	1	-	2	-	-	2	-	1	2	-
[CO4]	Suggest preventive measures to avoid accidents by analyzing the traffic conditions at site.	-	2	1	1	3	-	2	3	3	2	2	-
[CO5]	Undertake various types of road traffic studies.	-	3	-	2	3	-	-	3	3	2	2	-

G. Course Articulation Matrix: (Mapping of COs with POs)

Subject: Solid Waste Management

Code:DIP15243

3 Credits | Semester V

A. INTRODUCTION:

- To know various sources of solid.
- To learn techniques of collection and transportation of solid waste.
- To know various methods of disposal of solid waste.
- To understand and identify different biomedical and E-waste and their subsequent disposal techniques.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Identify the sources of solid waste.
- [CO2] Use the relevant method of disposal of Bio-medical and E-waste.
- [CO3] Suggest an action plan for composting of solid waste.
- [CO4] Select the relevant method of collection and transport of solid waste
- [CO5] Devise suitable disposal techniques for solid waste.

Criteria		Description	Maximum Marks							
Continuous	Internal	Internal Examination	20							
Assessment (CIA)		Attendance	5							
		Assignment	5							
End	Semester	End Semester Examination	70							
Examination(ESE)										
Total			100							
Attendance		A minimum of 75% Attendance	is required to be maintained by a							
		student to be qualified for taking up the End Semester examination.								
		The allowance of 25% includes all types of leaves including medical								
		leaves.								

C. ASSESSMENT PLAN:

D. SYLLABUS

INTRODUCTION: Definition of solid waste, types– domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.Sources, Classification– hazardous and non- hazardous waste. Physical and chemical characteristics of municipal solid waste.

STORAGE, COLLECTION & TRANSPORTATION OF MUNICIPAL SOLID WASTE: Collection, segregation, storage and transportation of solid waste. Tools and Equipment-Litter Bin, Broom, Shovels, Mechanical road sweepers, Community bin Transportation vehicles with their working capacity Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station- meaning, necessity, location.Role of rag pickers and their utility for society.

COMPOSTING OF SOLID WASTE: Concept of composting, Principles of composting process. Factors affecting the composting process. Methods– Manual Composting – Bangalore method, Indore Method, Mechanical Composting – Dano Process, Vermi composting.

TECHNIQUES FOR DISPOSAL OF SOLID WASTE: Solid waste management techniques – solid waste management hierarchy, waste prevention and waste reduction techniquesLand filling technique, Factors for site selection, Land filling methods-Areamethod, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid wasteIncineration of waste: Introduction of incineration process, Types of incinerators - Flash, Multiple chamber Incinerators, Products of incineration process with their use, Pyrolysis of waste – Definition, Methods

BIOMEDICAL & E-WASTE MANAGEMENT: Definition of Bio medical Waste. Sources and generation of Biomedical Waste and its classification, Bio medical waste Management technologies.Definition, varieties and ill effects of E- waste, Recycling and disposal of E- waste.

E. TEXT BOOKS

T1. Elements of Solid Hazardous Waste Management, O.P. Gupta, Khanna Book Publishing Co. T2. Solid Waste Management, K. Sasikumar, PHI learning, Delhi

F. REFERENCE BOOKS

- R1. Solid Waste Management, A.D. Bhide, Indian National Scientific Documentation Centre
- R2. Prospect and Perspectives of Solid Waste Management, B.B. Hosetti, New Age International Publisher

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the sources of solid waste.	2	2	-	-	3	1	-	1	1	2	2	-
[CO2]	2] Use the relevant method of disposal of Bio-medical and E-		3	-	2	3	2	2	-	1	1	2	-
	waste.												
[CO3]	Suggest an action plan for composting of solid waste.	-	3	1	2	3	2	1	-	-	1	2	-
[CO4]	Select the relevant method of collection and transport of		2	-	2	3	1	-	-	-	1	3	-
	solid waste.												
[CO5]	Devise suitable disposal techniques for solid waste.	-	2	-	3	3	2	-	1	1	-	1	-

Subject: Advanced Construction Technology

Code: DIP15214

3 Credits | Semester V

A. INTRODUCTION:

- To gain knowledge on different materials in advanced construction
- To know different methods in concreting
- To know the relevance of advanced construction methods for particular site condition.
- To identify the requisite hoisting and conveying machinery for the given situation.

B. COURSE OUTCOMES: At the end of the course, students will be able to

[CO1] Identify advanced equipment required for a particular site condition

[CO2] Apply advanced construction methods for given site condition.

[CO3] Examine the merits & demerits of different methods of concreting according to type of construction

[CO4] Select suitable hoisting and conveying equipment for a given situation.

[CO5] Develop a report on the relative merits and demerits of different prefabrication techniques according to type of construction.

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medica							
		leaves.							

C. ASSESSMENT PLAN:

D. SYLLABUS

ADVANCED CONSTRUCTION MATERIALS: Fibres: Use and properties of steel, polypropylene, carbon and glass fibres. Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP.Miscellaneous Materials: Properties and uses of acoustics, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives.Use of waste products and industrial byproducts in bricks, blocks, concrete and mortar.

ADVANCED CONSTRUCTION MATERIALS: Ready Mix Concrete: Necessity and use. Products and equipment for RMC plant. Transit mixers. Vibrators for concrete consolidation: Internal, needle, surface, platform and form vibratorsUnderwater Concreting: Procedure and equipment required for Tremie method, Drop bucket method. Properties, workability and water cement ratio of the concrete.Special concrete: procedure and uses of special concretes: Roller compacted concrete, Self-compacting concrete (SCC), Steel fibre reinforced concrete, Foam concrete, shotcreting.

ADVANCED TECHNOLOGY IN CONSTRUCTIONS: Construction of bridges: Equipment and machineries required for foundation and super structure. Construction of multistoried Building: Equipment and machinery required for construction of multistoried building such as lifts, belt conveyers, pumping of concrete.Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, prefabricated elements-wall panels, slab panels, beams, columns, door and window frames. Equipment and machineries used for placing and jointing of prefabricated elements.Strengthening of embankments by soil reinforcing techniques using geosynthetics

HOISTING & CONVEYING EQUIPMENTS: Hoisting Equipment: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes.Conveying Equipment: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

MISCELLANEOUS MACHINERIES & EQUIPMENTS: Excavation Equipment: Use, working and output of– bull dozers, scrapers, graders, trenching equipment, Tunnel boring machine, belt loaders, power shovels, JCB, and drag lines. Compacting Equipment: Output of plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers.Miscellaneous Equipment: Working and selection of equipment: Pile driving equipment, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipment, floor polishing and cutting machine, selection of drilling pattern for blasting, Explosives for blasting, Dynamite, process of using explosives.

E. TEXT BOOKS

- T1. Construction Management and Planning, B Sengupta & Guha, McGraw Hill Education, New Delhi.
- T2. Construction Planning Equipment and Methods, R L Peurifoy, McGraw Hill Co. Ltd. New York

T3. Construction of Structures and Management of works, S C Rangawala, Charotar Publication, Anand

T4. Materials of Construction, R C Smith, McGraw Hill Co. Ltd.

F. REFERENCE BOOKS

R1. Construction Engineering and Management, S C Sharma & S V Deodhar, Khanna Book Publishing, New Delhi

R2. Construction Engineering and Management, S Seetharaman, Umesh Publication, New Delhi

R3. Materials of Construction, D N Ghose, McGraw Hill Publishing Co, New Delhi

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify advanced equipment required for a particular site condition.	-	2	2	3	1	-	-	-	-	1	3	2
[CO2]	Apply advanced construction methods for given site condition.	-	2	2	3	1	1	-	-	-	1	2	3
[CO3]	Examine the merits & demerits of different methods of concreting according to type of construction.	-	3	2	1	1	2	-	-	-	2	2	3
[CO4]	Select suitable hoisting and conveying equipment for a given situation.	-	2	2	3	1	-	-	-	-	-	3	3
[CO5]	Develop a report on the relative merits and demerits of different prefabrication techniques according to type of construction.	-	3	2	2	2	1	-	-	1	1	3	3

Subject: Pavement Design and Maintenance

Code: DIP15241

3 Credits | Semester V

A. INTRODUCTION:

- To know types of pavements and their uses.
- To learn issues in design of flexible and rigid pavements.
- To understand methods of pavement evaluation.
- To learn pavement maintenance methods

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Identify the components of the given type of pavement.
- [CO2] Apply the different types of pavement evaluation and maintenance.
- [CO3] Compare the efficiencies of the different types of pavement for a given situation.
- [CO4] Decide type of maintenance required under different damaged conditions.
- [CO5] Design flexible and rigid pavements using the provisions of IRC.

C. A	SSESSMENT PLAN:
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Criteria		Description	Maximum Marks					
Continuous Internal		Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.						
		The allowance of 25% includes all types of leaves including medical						
		leaves.						

D. SYLLABUS

BASICS OF PAVEMENT DESIGN: Types of pavement - Flexible, Rigid and Semi Rigid. Comparison of pavement according to Design precision, maintenance, initial cost, stages of construction, availability of materials, surface characteristic, penetration of water in the pavement, utility location, glare and night visibility. Functions and characteristics of pavement. Factors affecting selection of type of pavement.

FUNDAMENTALS OF PAVEMENT DESIGN:Factors affecting pavement design-design wheel load, Traffic factors, Environmental factors,Road geometry and material, Characteristics of soil and Drainage situation.

DESIGN OVERVIEW OF FLEXIBLE & CONCRETE PAVEMENT: Methods of flexible pavement design-Theoretical method, Empirical method with and without soil strength test. IRC37 guidelines for design of flexible pavement (overview only)Factors affecting design of concrete pavement. IRC58 guidelines for design of concrete pavement (overview only) Joints-Need, Types, requirements, spacing of joints

PAVEMENT EVALUATION: Definition and purpose of pavement evaluation, Methods of Pavement evaluation –Visual rating, Pavement serviceability index, Roughness measurements, Beam deflection method

PAVEMENT MAINTENANCE: Types of pavement maintenance - routine, periodic, and special. Need for inspection and maintenance schedule. Causes of pavement failure and remedial measures. Typical flexible and rigid pavement failuresTypes and causes of damages in flexible pavement, surface defects, cracks. Deformations- Rutting, fatigue, settlement and upheaval. Disintegration- loss of aggregate, stripping, pothole. Remedial measures - slurry seal, liquid seal, fog seal, patching, ready mix patch.Types of damages to rigid pavement - cracking, spalling, slab rocking, settlement, joint sealant failure. Methods of repair - repair of spalled joints, full depth reconstruction, and replacement of dowel bars.

E. TEXT BOOKS

- T1. Highway Engineering, L R Kadiyali, Khanna Book Publishing House, New Delhi
- T2. Transportation Engineering Vol. II & V N Vazirani, S P Chaondola, Khanna Publishers, I. Delhi
- T3. Highway Engineering, S P Bindra, Dhanpat Rai Publications (P) Ltd

F. REFERENCE BOOKS

- R1. Principles of Pavement Design, E J Yoder, Wiley India Pvt Ltd.
- R2. Pavement Evaluation and Maintenance Management system, R S Kumar, University Press (India), Pvt. Ltd.
- R3. Principles, Practice and Design of Highway Engineering, S K Sharma, S Chand, New Delhi

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the components of the given type of pavement.	1	3	-	-	1	1	-	-	-	1	2	1-
[CO2]	Apply the different types of pavement evaluation and		3	-	2	3	2	-	-	1	1	3	3
	maintenance.												
[CO3]	Compare the efficiencies of the different types of pavement	-	3	2	2	-	-	-	2	-	2	2	2
	for a given situation.												
[CO4]	Decide type of maintenance required under different	-	2	2	1	2	1	-	2	1	1	3	2
	damaged conditions.												
[CO5]	Design flexible and rigid pavements using the provisions of	-	3	2	1	1	-	-	-	-	2	3	2
	IRC.												

Subject: Green Building & Energy Conservation

Code:DIP15228

3 Credits | Semester V

A. INTRODUCTION:

- To know various aspects of green buildings
- To use different steps involved in measuring environmental impact assessment.
- To relate the construction of green building with prevailing energy conservation policy and regulations.
- To know and identify different green building construction materials.
- To learn different rating systems and their criteria.
- **B.** COURSE OUTCOMES: At the end of the course, students will be able to
- [CO1] Identify various requirements for green building.
- [CO2] Execute the different steps of Environment Impact Assessment.
- [CO3] Relate the construction of green building with prevailing energy conservation policy and regulations.
- [CO4] Evaluate the criteria related to particular rating system for assessment of particular Green Building.
- [CO5] Supervise the construction of green building using green materials.

Criteria		Description	Maximum Marks					
Continuous Inter		Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance is required to be maintained by a						
		student to be qualified for taking up the End Semester examination.						
		The allowance of 25% includes all types of leaves including medical						
		leaves.						

C. ASSESSMENT PLAN:

D. SYLLABUS

INTRODUCTION TO GREEN BUILDING & DESIGN FEATURES: Definition of Green Building, Benefits, Components of Green Building, Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality.Site selection strategies, Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction

ENERGY AUDIT & ENVIRONMENTAL IMPACT ASSESSMENT (EIA):Energy Audit: Meaning, Necessity, Procedures, Types, Energy Management ProgramsEnvironmental Impact

Assessment(EIA): Introduction, EIA regulations, Steps in EIA process, Benefits, Limitations of EIA, Environmental clearancefor the CE projects.

ENERGY & ENERGY CONSERVATION: Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, And Biomass Energy. Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels. Energy conservation: Introduction, objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.

GREEN BUILDING: Principles and planning of Green building, Environmental design (ED) strategies for building construction. Improvement in environmental quality in civil structureGreen building materials- Bamboo, Rice husk ash concrete, plasticbricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Nontoxic paint, Green roofing

RATING SYSTEM: Introduction to (LEED) criteria, Indian Green Building council (IGBC) Green rating, Green Rating for Integrated Habitat Assessment. (GRIHA) criteria, Heating Ventilation Air Conditioning (HVAC) unit in green BuildingFunctions of Government organization working for Energy conservation and Audit(ECA)-National Productivity council(NPC), Ministry of New and Renewable *Energy* (MNRE), Bureau of Energy efficiency (BEE)

E. TEXT BOOKS

- T1. Sustainable construction: Green Building design and Delivery, C J Kibert, John Wiley Hoboken, New Jersey.
- T2. Energy Technology, O.P. Gupta, Khanna Publishing House, New Delhi
- T3. Green Building Project Planning and Cost Estimating, R S Means, John Wiley & Sons
- T4. Energy Management and Conservation, K V Sharma, P Venkataseshaiah, IK International.

F. REFERENCE BOOKS

- R1. Non-conventional Energy Resources, D S Chauhan, S K Sreevasthava, New Age International, Publishers, New Delhi
- R2. Handbook of Green Building Design and Construction, Sam Kubba, Butterworth-Heinemann
- R3. Alternative Building Materials and Technologies, K S Jagadeesh, Venkatta Rama Reddy & K S Nanjunda Rao, New Age International Publishers, Delhi.
G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COR	RRELA	TION	N WIT	'H PR	OGRA	M SP	ECIF	IC OU	TCO	MES	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify various requirements for green building.	-	2	-	-	3	3	2	-	-	1	2	3
[CO2]	Execute the different steps of Environment Impact	-	2	-	-	3	3	2	-	-	1	2	2
	Assessment.												
[CO3]	Relate the construction of green building with prevailing	1	3	-	-	3	3	2	-	-	1	3	3
	energy conservation policy and regulations.												
[CO4]	Evaluate the criteria related to particular rating system for	-	2	-	-	3	3	3	1	-	2	1	3
	assessment of particular Green Building.												
[CO5]	Supervise the construction of green building using green	-	2	1	-	3	3	1	-	1	-	3	2
	materials.												

Subject: Building Services & Maintenance

Code: DIP15216

3 Credits | Semester V

A. INTRODUCTION:

- To know the procedure for classifying various types of building services.
- To know the fire safety requirements for multi-storeyed building.
- To devise suitable plumbing system for given type of building.
- To understand the procedure for rainwater harvesting and solar water heater.
- To know the system for designing lighting, ventilation and acoustics for any building
- **B.** COURSE OUTCOMES: At the end of the course, students will be able to
- [CO1] List the various types of buildings and building services as per NBC.
- [CO2] Apply the system for lighting, ventilation and acoustics for any building.
- [CO3] Analyse the importance of rainwater harvesting and solar water heater for a particular building.
- [CO4] Evaluate the fire safety requirements for multi-storeyed buildings.
- [CO5] Devise suitable plumbing system for given type of building.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS

OVERVIEW OF BUILDING SERVICES: Introduction to building services, Classification of buildings as per NBC, Necessity of building services, Functional requirements of building, Types of building services i.e. HVAC (Heat, Ventilation and Air Conditioning), Escalators and lifts, fire safety, protection and control, plumbing services, rain water harvesting, solar water heating system, lighting, acoustics, sound insulation and electric installation etc.Role and responsibility of Building Service Engineer, Introduction to BMS (Building Management Services), Role of BMS, concept of smart building.

MODES OF VERTICAL COMMUNICATION: Objectives and modes of vertical communication in building. Lifts: Types and uses, Component of Lift- Lift Well, Travel, Pit,

Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, Landing Door, Call Indicators, Call Push etc., Design provisions for size calculation of space enclosure to accommodate lift services, Safety measures.Escalators: Types and Uses, Components, Design provisions for size calculation of space enclosure to accommodate escalator services, Safety measures.Ramp: Necessity, design consideration, gradient calculation, layout and Special features required for physically handicapped and elderly.

FIRE SAFETY: Fire protection requirements for multi-storeyed building, causes of fire in building, Fire detecting and extinguishing systems, Working principles of fire protection systems.Safety against fire in residential and public buildings (multi-storeyed building), NBC provision for fire safety, Fire resisting materials and their properties, Fire resistant construction, procedures for carrying out fire safety inspections of existing buildings, Provisions for evacuation.

PLUMBING SERVICES: Importance of plumbing, AHJ (Authority Having Jurisdiction) approval, Plumbing Terminology, Different types of plumbing fixtures, shapes/sizes, capacities, situation and usage, Traps, Interceptors.System of plumbing for building water supply: storage of water, hot and cold water supply system. System of plumbing for building drainage: Types of drainage system such as two pipe system, one pipe system, types of Vents and purpose of venting, Concept of grey water and reclaimed water.

E. TEXT BOOKS

- T1. Building Services Engineering David. V. Chadderton
- T2. Building Services Design Management Jackie Portman
- T3. Building Services H.W. Harrison & P.M. Trotman
- T4. Building Maintenance Ivor H. Stanley

F.REFERENCE BOOKS

- R1. Building Services Handbook Fred Hall & Roger Greeno
- R2. A Practical Guide to Traditional Building Maintenance Mike Wye

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	RREL	ATION	N WIT	TH PR	OGRA	AM SP	PECIF	IC OU	JTCO	MES	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	List the various types of buildings and building services as per NBC.	-	2	-	-	2	-	-	-	1	2	1	3
[CO2]	Apply the system for lighting, ventilation and acoustics for any building.	1	2	-	-	3	3	-	1	1	-	1	2
[CO3]	Analyse the importance of rain water harvesting and solar water heater for a particular building.	1	2	-	-	3	3	2	2	1	-	1	2
[CO4]	Evaluate the fire safety requirements for multi-storeyed buildings.	1	2	-	-	2	2	-	-	-	2	2	2
[CO5]	Devise suitable plumbing system for given type of building.	-	3	-	2	3	3	-	1	-	-	2	3

Subject: Engineering Economics & Accountancy

Code: DIP15223

3 Credits | Semester V

A. INTRODUCTION:

- To acquire knowledge of basic economics to facilitate the process of economic decisionmaking.
- To acquire knowledge on basic financial management aspects.
- To develop the basic skills to analyze financial statements.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Understand the concepts of financial management, investment, macro-economic environment of business and its impact on enterprise.
- [CO2] Understand accounting systems and analyse financial elements using ratio analysis.
- [CO3] Analyse cost elements of the product and its effect on decision-making.
- [CO4] Summarize the accounting data for managerial decisions.
- [CO5] Prepare accounting records and interpret data for managerial decisions.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	-

C. ASSESSMENT PLAN:

D. SYLLABUS

INTRODUCTION: Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

DEMAND & SUPPLY ANALYSIS:Demand; Types; Determinants of demand; Demand function; Demand elasticity; Demand forecasting;Supply; Determinants of supply; Supply function;Supply elasticity.

PRODUCTION & COST ANALYSIS:Production function; Returns to scale; Production optimization;Least cost input; Managerial uses of production functionCost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

PRICINGDeterminants of Price; Pricing under different objectives and different market structures; Price discrimination; methods in practice; Role of Government in pricing control.

FINANCIAL ACCOUNTING : Balance sheet and related concepts; Profit & Loss Statement and related conceptsFinancial Ratio Analysis; Cash flow analysis; Funds flow analysis; Comparative financial statements; Analysis & Interpretation of financial statements; Investments; Risks and return evaluation of investment decision; Average rate of return; Payback Period; Net Present Value; Internal rate of return,

E. TEXT BOOKS

- T1. Fundamentals of Financial Management, Prasanna Chandra, Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.
- T2. Economics, A Paul Samuelson. and W D Nordhaus, Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

F. REFERENCE BOOKS

R1. Managerial Economics; Applications, Strategy and Tactics, Moyer McGuigan, and Harris, Thomson South Western, 10th Edition, 2005.

R2. Managerial Economics in a global economy, Salvatore Dominick, Thomson South Western, 4th Edition, 2001.

R3.Basic Financial Accounting for Management, Paresh Shah, Oxford University Press, New Delhi,

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	RREL	ATIO	N WIT	TH PR	OGRA	AM SF	PECIF	IC OI	UTCO	MES	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the concepts of financial management, investment, macro-economic environment of business and its impact on enterprise.	1	-	-	-	1	-	1	1	-	-	1	2
[CO2]	Understand accounting systems and analyse financial elements using ratio analysis.	1	-	-	-	1	-	1	1	1	1	-	2
[CO3]	Analyse cost elements of the product and its effect on decision making.	1	-	-	-	1	-	1	1	1	1	1	2
[CO4]	Summarize the accounting data for managerial decisions.	1	-	-	-	1	-	1	1	1	1	1	2
[CO5]	Prepare accounting records and interpret data for managerial decisions.	1	-	-	-	1	-	1	1	-	1	1	2

Subject: Renewable Energy Technologies

Code: DIP15251

3 Credits | Semester V

A. INTRODUCTION:

- To understand present and future scenario of world energy use.
- To understand fundamentals of solar energy systems.
- To understand basics of wind energy.
- To identify different available non-conventional energy sources.

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Understand present and future energy scenario of the world.
- [CO2] Demonstrate the various methods of solar energy harvesting.
- [CO3] Analyse wind data of a particular site and estimate the possible energy that can be generated.
- [CO4] Evaluate appropriate methods for Bio-energy generations from Bio-wastes.
- [CO5] Identify suitable energy sources for a location.

C. ASSESSMENT PLAN:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

INTRODUCTION: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and the World; Potentials; Achievements/ Applications; Economics of renewable energy systems.

SOLAR ENERGY: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating CollectorsSolar direct Thermal Applications; Solar thermal Power GenerationFundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

WIND ENERGY: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

BIO ENERGY: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

OTHER RENEWABLE ENERGY SOURCES:Tidal energy; Wave Energy; Open and Closed OTEC Cycles;Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

E. TEXT BOOKS

- T1. Non-Conventional Energy Sources, G D Rai, Khanna Publishers, New Delhi
- T2. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K
- T3. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi
- T4. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.

F. REFERENCE BOOKS

- R1. Energy and The Environment second edition, RA Ristinen and J J Kraushaar, John Willey & Sons, New York,
- R2. Solar Energy, S P Sukhatme, Tata McGraw Hill Publishing Company Ltd., New Delhi
- R3. Renewable Energy Resources, JW Twidell and AD Weir, ELBS
- R4. Renewable Energy Sources, JW Twidell and AD Weir, EFN Spon Ltd., UK

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand present and future energy scenario of the world.	2	1	-	1	3	3	-	-	1	2	2	2
[CO2]	Demonstrate the various methods of solar energy harvesting.	2	3	1	2	3	3	-	1	1	-	2	1
[CO3]	Analyse wind data of a particular site and estimate the possible energy that can be generated.	-	2	-	-	2	2	-	1	-	-	2	-
[CO4]	Evaluate appropriate methods for Bio-energy generations from Bio-wastes.	1	2	-	2	3	3	1	-	-	1	2	2
[CO5]	Identify suitable energy sources for a location.	2	2	-	-	3	3	-	1	1	2	2	2

Subject: Numerical Methods

Code: DIP15239

3 Credits | Semester V

A. INTRODUCTION:

- To develop the mathematical skills of the students in the areas of numerical methods.
- To teach the applications of numerical methods in engineering subjects, which require solutions of linear systems, finding eigen values, eigenvectors, interpolation, solving ODEs, PDEs and dealing with statistical problems like testing of hypotheses.
- To lay the foundation of computational mathematics for specialized studies and research.
- B. COURSE OUTCOMES: At the end of the course, students will be able to
- [CO1] Recall basic Interpolation methods and Finite Difference concepts.
- [CO2] Apply numerical methods to find solution of algebraic equations using different methods under different conditions.
- [CO3] Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
- [CO4] Select the best method of finite differences for solution of linear equations.
- [CO5] Formulate different numerical methods to find solutions of algebraic equations under different conditions.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes al	l types of leaves including medical
		leaves.	

C. ASSESSMENT PLAN:

D. SYLLABUS

INTRODUCTION TO NUMERICAL METHODS: Approximation and Errors (Truncation & round-off), Numerical solutions of non-linear and transcendental equations, Newton Raphson's Method, Bisection Method, Regula Falsi method

FINITE DIFFERENCE & INTERPOLATION:Backward and Forward differences, Finite difference interpolation formula, Newton's forward difference formula, Newton's Backward difference formula, Lagrange's Interpolation formula, Inverse interpolation by Lagrange's method

NUMERICAL DIFFERENTIATION & INTEGRATION:Newton's forward and backward differentiation formula, Trapezoidal rule, Simpson's 1/3 rule for numerical integration, Simpson's 3/8 rule for numerical integration, difference equations, simple problems only

SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Method of solution by Gauss-Elimination, Gauss-Jordan method, Jacobi-iterative method, Gauss-Seidal iteration method, Factorization method

ORDINARY DIFFERENTIAL EQUATIONS: Method of solving ordinary differential equation of 1st order by Picard's method, Euler's method, Modified Euler's method, Taylor's series method, Runge-Kutta method.

E. TEXT BOOKS

T1. HigherEngineeringMathematics, B.S.Grewal, Khanna Publishers

F. REFERENCE BOOKS

R1. IntroductoryMethods of Numericalanalysis, S.S.Sastry, PHI Learning Pvt. Ltd. R2. Numerical analysis, Lalji Prasad, Paramount Publication

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											S
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Recall basic Interpolation methods and Finite Difference concepts.	2	-	-	-	-	-	-	1	-	2	2	2
[CO2]	Apply numerical methods to find solution of algebraic equations using different methods under different conditions.	2	-	-	-	-	-	-	1	-	2	2	2
[CO3]	Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.	2	-	-	-	-	-	-	1	-	2	2	2
[CO4]	Select the best method of finite differences for solution of linear equations.	2	-	-	-	-	-	-	2	-	2	2	2
[CO5]	Formulate different numerical methods to find solutions of algebraic equations under different conditions.	3	-	-	-	-	-	-	2	-	2	2	2

Subject: Water Resource Engineering

Code: DIP15248

3 Credits | Semester V

A. INTRODUCTION:

- To learn estimation of hydrological parameters.
- To understand water demand of crops and provisions to meet the same.
- To know planning of reservoirs and dams.
- To design irrigation projects, canals and other diversion works.
- **B.** COURSE OUTCOMES: At the end of the course, students will be able to
 - [CO1] Understand the basics of Hydrology and Hydraulic structures.
 - [CO2] Execute Minor and Micro Irrigation Schemes.
 - [CO3] Estimate different hydrological parameters and crop water requirements of a command area and capacity of canals.
 - [CO4] Select the relevant Cross Drainage works for the specific site conditions.
 - [CO5] Design, construct and maintain simple irrigation regulatory structures.

C. ASSESSMENT PLAT	N:
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Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

INTRODUCTION TO HYDROLOGY: Hydrology: Definition and Hydrological cycle Rain Gauge: Symons rain gauge, automatic rain gauge, Methods of calculating average rainfall: Arithmetic mean. Isohyetal, and Theissen polygon method. Runoff, Factors affecting Run off, Computation of run–off. Maximum Flood Discharge measurement: Rational and empirical methods, Simple numerical problems. Yield and Dependable yield of a catchment, determination of dependable yield

CROP WATER REQUIREMENTS AND RESERVOIR PLANNING: Irrigation and its classification. Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation, factors affecting duty, Problems on water requirement and capacity of canal. Methods of application of irrigation water and its assessment. Surveys for

irrigation project, data collection for irrigation project. Area capacity curve. Silting of reservoir, Rate of silting, factors affecting silting and control measures. Control levels in reservoir, Simple numerical problems on Fixing Control levels

DAMS AND SPILLWAYS: Dams and its classification: Earthen dams and Gravity dams (masonry and concrete). Earthen Dams – Components with function, typical cross section, seepage through embankment and foundation and its control. Methods of construction of earthen dam, types of failure of earthen dam and preventive measures. Gravity Dams – Forces acting on dam, Theoretical and practical profile, typical cross section, drainage gallery, joints in gravity dam, concept of high dam and low dam. Spillways-Definition, function, location, types and components, Energy dissipaters.

MINOR AND MICRO IRRIGATION: Bandhara irrigation: Layout, components, construction and working, solid and open bandhara. Percolation Tanks – Need, selection of site. Lift irrigation Scheme-Components and their functions, Lay out. Drip and Sprinkler Irrigation- Need, components and Layout. Well irrigation: types and yield of wells, advantages and disadvantages of well irrigation.

DIVERSION HEAD WORKS & CANALS: Weirs – components, parts, types, K.T. weir – components and construction, Diversion head works – Layout, components and their function. Barrages – components and their functions. Difference between weir and BarrageCanals – Classification according to alignment and position in the canal network, Cross section of canal in embankment and cutting, partial embankment and cutting, balancing depth, Design of most economical canal section. Canal lining - Purpose, material used and its properties, advantages. Cross Drainage works- Aqueduct, siphon aqueduct, super passage, level crossing. Canal regulators- Head regulator, Cross regulator, Escape, Falls and Outlets

E. TEXT BOOKS

T1. Punmia, B.C., Pande, B, Lal, Irrigation and Water Power Engineering, Laxmi Publications

T2. Subramanayan, Engineering Hydrology, McGraw Hill.

T3. Basak, N.N., Irrigation Engineering, McGraw Hill Education

T4. Garg, S K, Irrigation and Hydraulic Structures, Khanna Publishers, Delhi.

F. REFERENCE BOOKS

R1. Mutreja K N, Applied Hydrology, McGraw Hill

R2. Priyani V.B., Irrigation Engineering, Charotar Book Stall, Anand.

R3. Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.

R4. Asawa, G.L., Irrigation and water resource Engineering, New Age

R5. Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S.Chand

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the basics of Hydrology and Hydraulic structures.	1	3	-	1	2	-	-	1	1	2	1	1
[CO2]	Execute Minor and Micro Irrigation Schemes.	-	2	1	-	3	1	-	-	1	2	2	2
[CO3]	Estimate different hydrological parameters and crop water requirements of a command area and capacity of canals.	1	3	1	1	2	-	-	-	1	2	2	2
[CO4]	Select the relevant Cross Drainage works for the specific site conditions.	-	3	2	-	2	2	-	2	1	1	3	2
[CO5]	Design, construct and maintain simple irrigation regulatory structures.	-	3	1	-	-	1	-	2	-	1	3	2

Subject: Design of Steel & RCC Structure Lab Code: DIP15221 1 Credits | Semester V

A. INTRODUCTION:

• Following are the objectives of this course: Learn the behavior of structural steel components Ability to perform analysis and design of steel members and connections

B. COURSE OUTCOMES: At the end of the course, students will be able to

- [CO1] Understand design principles governing Steel and Reinforced Concrete Sections.
- [CO2] Apply the provisions of IS 456 and IS 800.
- [CO3] Analyse Steel I and Channel Sections and Reinforced Concrete Beam, Column and Shear Sections.
- [CO4] Select the most appropriate or economic section under a given condition of load and supports.
- [CO5] Design Steel and Reinforced Concrete sections.

C. Assessment Plan:

Criteria	Description	Maximum Marks				
Continuous Internal	Internal Examination	5				
Assessment (CIA)	Attendance	5				
	Assignment	5				
End Semester	End Semester Examination	35				
Examination(ESE)						
Total		50				
Attendance	A minimum of 75% Attendance	is required to be maintained by				
	a student to be qualified for taking up the End Semester					
	examination. The allowance of 25% includes all types of leaves					
	including medical leaves.					

D. SYLLABUS

Sl.No	Name of Practical
1	Draw any five commonly used rolled steel sections and five built up sections.
2	Summarize the provisions of IS 800 required for the design of tension member in report
3	Compile relevant clauses from IS 800 required for the design of a compression member.
4	Compile relevant clauses from IS 800 required for the design of a compression member.
5	Draw sketches for single & double lacing of given built up columns.
6	Draw sketches for battening of given built up columns.
7	Draw cross section, strain diagram & stress diagram for singly reinforced section
8	Draw cross section, strain diagram & stress diagram for doubly reinforced section.
9	Design simply supported I section steel beam for udl.

10	Design beams section for shear as per IS 800 provisions.
11	Draw sketches of different types of column footings

E. TEXT BOOKS

- T1. N. Subramanian, Design of Steel Structures, Oxford University Press
- T2. K.S.Sairam, Design of Steel Structures, Pearson Publication, Chennai, Delhi
- T3. S.U.Pillai & Devdas Menon, Reinforced concrete Design, McGraw Hill Publications, New Delhi.

F. REFERENCE BOOKS

R1. N.Krishna Raju, & R. N. Pranesh, Reinforced Concrete Design Principles and Practice, New Age International, Mumbai

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO
		1	2	3	4	5	6	7	8	9	10	1	2
[CO1]	1] Understand design principles governing Steel and			2	2	1	1	-	1	-	1	2	1
	Reinforced Concrete Sections.												
[CO2]	Apply the provisions of IS 456 and IS 800.	2	3	1	-	-	2	-	1	-	2	3	1
[CO3]	Analyse Steel I and Channel Sections and Reinforced	2	3	-	1	-	-	-	-	-	1	3	-
	Concrete Beam, Column and Shear Sections.												
[CO4]	Select the most appropriate or economic section under a		3	-	2	1	1	-	-	-	2	2	1
	given condition of load and supports.												
[CO5]	Design Steel and Reinforced Concrete sections.	1	3	1	-	1	1	-	-	-	1	2	-

Subject: Estimation Costing & Valuation Lab

Code: DIP15224

1 Credits | Semester V

A. INTRODUCTION:

- Learn the behavior of structural steelcomponents Ability to perform analysis
- and design of steel members and connections
- B. COURSE OUTCOMES: At the end of the course, students will be able to
- [CO1] Recall the fundamentals of estimation and costing.
- [CO2] Prepare checklist of items of construction and rate analysis.
- [CO3] Compare actual quantity with estimated quantity.
- [CO4] Select modes of measurement for different items of work.
- [CO5] Develop a detailed estimate for civil engineering work.

C. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	5					
Assessment (CIA)	Attendance	5					
	Assignment	5					
End Semester	End Semester Examination	35					
Examination(ESE)							
Total		50					
Attendance	A minimum of 75% Attendance	is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

D. SYLLABUS

Sl.No	Name of Practical
1	Prepare the list of items to be executed with units for detailed estimate of a given
	structure from the given drawing
2	Prepare a report on market rates for given material, labour wages, hire charges of tools &
	equipments required to construct the given structure as mentioned in at Serial number 1
	above
3	Prepare bill of quantities of given item from actual measurements
4	Prepare approximate estimate for the given civil engineering works
5	Calculate the quantity of items of work from the given set of drawings using standard
	measurementsheet for load bearing residential structure using description of item from
	DSR(1BHK Building with staircase)
6	Prepare detailed estimate from the given set of drawings using "standard measurement
	andabstract format" for RCC framed structure using description of item from DSR along
	withface sheet and prepare quarry chart, lead statement (G+1 Building).

7	Calculate the reinforcement quantities from the given set of drawings for a room size of
	3 mX 4 m with bar bending schedule (footing, column, beam, lintel with chajja, slab)
8	Prepare rate analysis for the given five item of works.
9	Prepare detailed estimate of road of one kilometre length from the given drawing.
10	Prepare detailed estimate of small Septic tank from the given set of drawings.
11	Prepare detailed estimate of well from the given set of drawing

E. TEXT BOOKS

T1. Estimating&costinginCivil Engineering, B.N.Datta, UBSPublishersDistributors PvtLtd NewDelhi

T2. Estimating&costing, SpecificationandValuationin CivilEngineering, M.Chakraborti, M.Chakraborti,Calcutta

T3. CivilEngineeringEstimating, ContractsandaccountsVol.I, B.S.Patil, OrientLongman,Mumbai

F. REFERENCE BOOKS

 $R1.\ Estimating \& costing,\ S.C. Rangwala,\ Charotar Publication An and$

R2. Estimating&costing, G. S.Birdie, DhanpatRaiandSonsDelhi

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM SPECIFIC OUTCOMES											
	I 1		PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Recall the fundamentals of estimation and costing.	-	2	-	-	2	-	3	2	-	1	3	2
[CO2]	Prepare checklist of items of construction and rate	-	2	-	-	2	-	3	2	1	-	3	3
	analysis.												
[CO3]	Compare actual quantity with estimated quantity.	-	2	-	-	3	-	1	2	-	2	3	3
[CO4]	Select modes of measurement for different items of work.	1	2	-	1	2	-	-	1	-	1	3	3
[CO5]	Develop a detailed estimate for civil engineering work.	-	3	1	-	3	1	2	2	1	1	3	3

Subject:Summer Internship-II

Code: DIP15244 3 Credits | Semester V

A. Introduction:

- Following are the intended objectives of internship training:
- Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Experience gained from the 'Industrial Internship' in classroom will be use in classroom discussions.
- Create conditions conducive to quest for knowledge and its applicability on the job

B. Assessment Plan:

Criteria	Description	Maximum Marks					
Continuous Internal	Internal Examination	30					
Assessment (CIA)							
End Semester	End Semester Examination	70					
Examination(ESE)							
Total		100					
Attendance	A minimum of 75% Attendance	e is required to be maintained by					
	a student to be qualified for taking up the End Semester						
	examination. The allowance of 25% includes all types of leaves						
	including medical leaves.						

GUIDELINES FOR INTERNSHIP

Summer Internship -II should be undertaken in an industry only

S.No.	Suggested Schedule	Suggested Duration (In weeks)	Activities
1	Summer/winter vacation after 4th Semester	4-6	Inter/Intra Institutional Activities

Subject:Major Project-I

Code: DIP15236

1 Credits | Semester V

A. Introduction: The objective of this course is to prepare students to use applications of the theory and practical learned during the course. It will also help students to develop an industry or research oriented project. This course helps students how to carry out project/studies in the field of interest of the student or as given by the industry.

B.Assessment Plan:

Criteria	Description	Maximum Marks				
Continuous Internal	Internal Examination	15				
Assessment (CIA)						
End Semester	End Semester Examination	35				
Examination(ESE)						
Total		50				
Attendance	Completion of Internship during the Summer vacation					

GUIDELINES FOR INTERNSHIP

Major Project-I should be based on real/live problems of the Industry/Govt./NGO/MSME/Rural Sector or an innovative idea having the potential of a Startup



Syllabus of Diploma in Civil Engineering Semester-VI

ARKAJAIN University, Jharkhand

School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) Scheme of Study (w.e.f Batch 2020-23)

SEMESTER –I (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-I	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER I (Group-B)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -I	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

SEMESTER II (Group-A)

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA *	Attendanc e
1	Mathematics -II	BSC	4	4	100	70	20	5	5
2	Fundamentals of Electrical & Electronics Engg.	ESC	4	4	100	70	20	5	5
3	Introduction to IT system	ESC	3	3	100	70	20	5	5
4	Engineering Mechanics	ESC	4	4	100	70	20	5	5
5	Environmental Science	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Fundamentals of electrical & electronics Engg. Lab	ESC	1	2	50	35	5	5	5
7	Introduction to IT system Lab	ESC	1	2	50	35	5	5	5
8	Engineering Mechanics Lab	ESC	1	2	50	35	5	5	5
9	Engineering Graphics	ESC	2	4	50	35	5	5	5
	Total		20	27	650	455	110	42.5	42.5

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practic al Exam	Mid Term Theory/ Practic al Exam	CIA*	Attendanc e
1	Communication Skills in English	HSC	3	3	100	70	20	5	5
2	Mathematics-II	BSC	4	4	100	70	20	5	5
3	Applied Physics	BSC	4	4	100	70	20	5	5
4	Applied Chemistry	BSC	4	4	100	70	20	5	5
	Practical								
5.	Engineering Workshop Practice	ESC	2	4	50	35	5	5	5
6.	Applied Physics Lab	BSC	1	2	50	35	5	5	5
7.	Applied Chemistry Lab	BSC	1	2	50	35	5	5	5
8.	Communication Skills in English Lab	HSC	1	2	50	35	5	5	5
	Total		20	25	600	420	100	40	40

SEMESTER –**II**(**Group-B**)

SEMESTER-III

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Construction Material	PCC	3	3	100	70	20	5	5
2	Basic Surveying	PCC	3	3	100	70	20	5	5
3	Mechanics of Materials	PCC	3	3	100	70	20	5	5
4	Building Construction	PCC	3	3	100	70	20	5	5
5	Geotechnical Engineering	PCC	3	3	100	70	20	5	5
6	Essence of Indian Knowledge and Tradition	AC	0	2	50	35	10	2.5	2.5
	Practical								
7	Construction Material Lab	PCC	1	2	50	35	5	5	5
8	Mechanics of Materials Lab	PCC	1	2	50	35	5	5	5
9	Geotechnical Engineering Lab	PCC	1	2	50	35	5	5	5
10	Basic Surveying Lab	PCC	1	2	50	35	5	5	5
11	Summer Internship- 1(3-4 Weeks)	PROJ	2	0	50	35	15	0	0
	TOTAL		21	25	800	560	145	47 .5	47.5

SEMESTER-IV

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendanc e
1	Hydraulics	PCC	3	3	100	70	20	5	5
2	Advanced Surveying	PCC	3	3	100	70	20	5	5
3	Theory of Structure	PCC	3	3	100	70	20	5	5
4	Transportation Engineering	PCC	3	3	100	70	20	5	5
5	Concrete Technology	PCC	3	3	100	70	20	5	5
6	Elective-I Precast and Prestressed Concrete Construction &Project Management Rural Construction Technology	PEC	3	3	100	70	20	5	5
	Practical								
7	Concrete Technology Lab	PCC	1	2	50	35	5	5	5
8	Building Planning & Drawing Lab	PCC	1	2	50	35	5	5	5
9	Advanced Surveying Lab	PCC	1	2	50	35	5	5	5
10	Transportation Engineering Lab	PCC	1	2	50	35	5	5	5
11	Hydraulics Lab	PCC	1	2	50	35	5	5	5
12	Minor Project	PROJ	2	4	50	35	15	0	0
	TOTAL		25	32	900	630	160	55	55

SEMESTER V

S.No	Name of the Subject	Type of Paper	Credi t	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Design of steel & RCC structure	PCC	3	3	100	70	20	5	5
2	Estimation Costing & Valuation	PCC	3	3	100	70	20	5	5
	Elective-II								
	Traffic Engineering								
3	Solid Waste Management	PEC	3	3	100	70	20	5	5
	Advanced Construction Technology								
	Elective-III Pavement Design & maintenance								
4	Green Building and Energy Conservation	PEC	3	3	100	70	20	5	5
	Building Services and Maintenance								
5	Open Elective-I Engineering Economics & Accountancy Renewable Energy	OEC	3	3	100	70	20	5	5
	Numerical Methods								
6	Water Resource Engineering	PCC	3	3	100	70	20	5	5
	Practical								
7	Design of steel & RCC structure Lab	PCC	1	2	100	70	20	5	5
8	Estimation Costing & Valuation Lab	PCC	1	2	50	35	5	5	5
9	Summer Internship-II(4-6 Weeks)	PROJ	3	0	100	70	30	0	0
10	Major Project-I (Project to be carried over to next semester)	PROJ	1	2	50	35	15	0	0
	TOTAL		24	24	900	630	190	40	40

Project to be carried over to next semester

SEMESTER VI

S.No	Name of the Subject	Type of Paper	Credit	Contact Hours Per Week	Total Marks	End Term Theory/ Practical Exam	Mid Term Theory/ Practical Exam	CIA*	Attendance
1	Public Health Engineering	HSMC	3	3	100	70	20	5	5
	Elective-IV								
	Repairs and Maintenance of Structures								
2	Advanced Design of Structures	PEC	3	3	100	70	20	5	5
	Tendering and Accounts								
3	Entrepreneurship and Start-ups	PROJ	4	4	100	70	20	5	5
	Open Elective-II								
	Project Management								
4	Disaster Management	OEC	3	3	100	70	20	5	5
	Operations Research								
	Open Elective-III								
	Sustainable Development	OEC							
5	Artificial Intelligence		3	3	100	70	20	5	5
	History of Science and Engineering								
6	Indian constitution	AC	0	2	50	35	10	2.5	2.5
	Practical								
6	Public Health Engineering Lab	HSMC	1	2	50	35	5	5	5
7	Seminar	PROJ	1	2	50	35	5	5	5
8	Major Project-II	PROJ	3	0	100	100	0	0	0
	TOTAL		21	20	700	520	110	35	35

Sl. No	Type of Paper	No. of Paper	Total Credit
1	Humanities and Social Sciences Courses (HSC)	4	8
2	Basic Science courses(BSC)	6	18
3	Engineering Science courses (ESC)	8	18
4	Professional core courses (PCC)	24	47
5	Professional Elective courses(PEC)	4	12
6	Open Electives Courses (OEC)	3	9
7	Project work, seminar and internship in industry or elsewhere(PROJ)	6	12
8	Audit Courses [Environmental Sciences, Induction training,	3	(non-credit)
	Indian Constitution, Essence of Indian Knowledge		
	Tradition](AC)		
	Total	58	124

Distribution of Credit across 6 semesters:

CIA - Continuous Internal Assessment - Based on Projects / Assignment during the semester

Note:

AICTE Activity Points to be earned by students admitted to Diploma program (For more details refer to Chapter 6, AICTE, Activity Point Program, Model Internship Guidelines):

Every regular student, who is admitted to the 3 year Diploma program, is required to earn 75 activity points in addition to the total credits earned for the program. Students entering 3 years Diploma Program through lateral entry are required to earn 50 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students 6th Semester grade card. The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled.

Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

Incase student fail to earn the prescribed activity points, Sixth semester Grade Card shall be issued only after earning the required activity Points.

Students shall be eligible for the award of degree only after the release of the Six Semester grade card.

There are two groups (A & B) in semester 1 & 2. The Group division will be decided by The Dean SoE & IT before commencement of classes

ARKAJAIN University, Jharkhand School of Engineering & IT Department of Engineering Faculty – Diploma in Civil Engineering (DECL) PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

After completing this undergraduate program, a learner:

PO.1]. Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems

[PO.2]. Discipline knowledge: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.

[PO.3]. Experiments and practice: An ability to plan and perform experiments and practices and to use the results to solve engineering problems.

[PO.4]. Engineering Tools: Apply appropriate technologies and tools with an understanding of the limitation.

[PO.5]. The engineer and society: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

[PO.6]. Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

[PO.7]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[PO.8]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

[PO.9]. Communication: An ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.10]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Survey, Planning, designing, estimation, execution and maintenance of civil engineering structures.

[PSO.2]. Demonstrate a knowledge and understanding of Construction management, business practices and understand their limitations

Subject: Public Health Engineering

Code: DIP16272

3 Credits | Semester VI

A. Introduction:

- To learn the principles for identification of sources of surface and subsurface water
- To learn calculation of population and requirement of drinking water
- To understand the plotting of water supply scheme highlighting different features
- To know evaluation of characteristics and treatment of sewage

B. Course Outcomes: At the end of the course

[CO1] Identify the sources of surface and subsurface water.

- [CO2] Draw labelled layout for water supply scheme.
- [CO3] Estimate the quantity of drinking water required for a population.
- **[CO4]** Evaluate characteristics and suggest treatment of sewage.

[CO5] Devise suitable water treatment technique.

C. Assessment Plan:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

SOURCES, DEMAND AND QUALITY OF WATER: Water supply schemes - Objectives, components, Sources of water: Surface and Subsurface sources of water, Intake Structures, Definition andtypes, Factors governing the location of an intake structure, Types of intakes. Demand of water: Factors affecting rate of demand, Variations of water demands Forecasting of population. Methods of forecasting of population, (Simple problems on forecasting of population) Design period, estimating of quantity of water supply required for city or town. Quality of water: Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli, B coli index, MPN, Samplingof water, Water quality standards as per IS 10500.
PURIFICATION OF WATER:Purification of Water: Objectives of water treatment, Aerationobjects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, types of sedimentation tanks, Clariflocculator.Filtration - mechanization of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter. Construction and working of slow sand filter and rapid sand filter, operational problems in filtration. Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, Flow diagram of water treatment plants. Miscellaneous water Treatments: Introduction to water softening, DE fluoridation techniques

CONVEYANCE AND DISTRIBUTION OF WATER: Conveyance: Types of Pipes used for conveyance of water, choice of pipe material, Types ofjoints & Types of valves- theiruse, location and function on a pipeline.Distribution of water: Methods of distribution of water-Gravity, pumping, and combinedsystem, Service reservoirs – functions and types, Layouts of distribution of Water-Dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages.

DOMESTIC SEWAGE AND SYSTEM OF SEWERAGES: Building Sanitation: Necessity of sanitation, Necessity to treat domestic sewage, Definitions- Sewage, sullage, types of sewage. Definition of the terms related to Building SanitationCivilEngineering Curriculum Structure 122 Water pipe, Rain water pipe, Soil pipe, Sullage pipe, Vent pipe. Building Sanitaryfittings-Watercloset – Indian and European type, flushing cistern, wash basin, sinks, Urinals. Traps types, qualities of good trap. Systems of plumbing - one pipe, two pipe, single stack, choice of system. Principles regarding design of building drainage, inspection and junction chambers, their necessity, location, size and shapeSystems of Sewerage and Sewer Appurtenances: Types of Sewers, Systems of sewerage, self-cleansing velocity and non-scouring velocity, Laying, Testing and maintenance of sewers, Manholes and Drop Manhole-component parts, location, spacing, construction details,Sewer Inlets, Street Inlets.

CHARACTERISTICS AND TREATMENT OF SEWAGE: Analysis of sewage: Characteristics of sewage, B.O.D., C.O.D. and its significance. Central Pollution Control Board Norms for discharge of treated sewage, Objects of sewage treatmentand flow diagram of conventional sewage treatment plant.Treatment of Sewage: Screening, Types of screens, Grit removal, Skimming, Sedimentation of sewage, Aerobic and anaerobic process, Sludge digestion, trickling filters, Activatedsludge process, Disposal of sewage, Oxidation pond, Oxidation ditch. Septic tank, Recyclingand Reuse of domestic waste

E. TEXT BOOKS

- T1. Sharma S.C, Environmental Engineering, Khanna Publishing House, New Delhi
- T2. Garg, S.K., Environmental Engineering Vol. I and Vol. II, Khanna Publishers
- T3. Birdie, G. S. and Birdie, J. S.Water Supply and Sanitary Engineering, Dhanpat Rai

T4. Punmia, B C, Environmental Engineering, vol. I and II, Laxmi Publishers

F. REFERENCE BOOKS

R1. Gupta, O.P., Elements of Environmental Pollution Control, Khanna Publishing House, Delhi
R2. Rao, C.S., Environmental Pollution Control Engineering, New Age International
R3. Peavy H S, Rowe D R, and Tchobanoglous G, Environmental Engineering, McGraw
R4. Basak N N, Environmental Engineering, McGraw Hill Publishers

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES									CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES		
		POPOPOPOPOPOPOPO							PSO 1	PSO 2			
		1	2	3	4	5	6	7	8	9	10		
[CO1]	Identify the sources of surface and subsurface water.	2	1	-	-	2	-	-	-	1	2	2	1
[CO2]	Draw labelled layout for water supply scheme.	1	3	1	2	3	2	-	-	-	2	2	1
[CO3]	3] Estimate the quantity of drinking water required for a		2	-	2	2	-	-	-	1	1	2	1
	population.												
[CO4]	Evaluate characteristics and suggest treatment of sewage.		3	1	-	3	1	1	1	1	2	2	-
[CO5]	Devise suitable water treatment technique.	-	3	2	3	3	3	-	1	-	-	2	2

Subject: Repairs and Maintenance of Structures

Code: DIP16258

3 Credits | Semester VI

A. Introduction:

- To learn about types of maintenance techniques
- To understand causes of various types of damages.
- Civil Engineering Curriculum Structure 124
- To know about relevant materials for repair.
- To learn methods of retrofitting for different structures
- B. Course Outcomes: At the end of the course, students will be able to
 - [CO1] Identify the type of maintenance needed for a given damaged structure.
 - [CO2] Apply relevant method of retrofitting for re-strengthening of structures.
 - [CO3] Assess causes of damages in various types of structure.
 - [CO4] Select the relevant material for repair of the given structure.
 - [CO5] Suggest relevant technique to restore the damages of the given structural elements.

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

BASICS OF MAINTENANCE: Types of Maintenances - repair, retrofitting, re-strengthening, rehabilitation and restoration.Necessity, objectives and importance of maintenance.Approach of effective management for maintenance.Periodical maintenance: check list, maintenance manual containing building plan, reinforcementdetails, material sources, maintenance frequency, corrective maintenance procedures and sources. Pre- and post- monsoon maintenance.

CAUSES AND DETECTION OF DAMAGES: Causes of damages due to distress, earthquake, wind, flood, dampness, corrosion, fire, deterioration,termites, pollution and foundation settlement.Various aspects of visual observations for detection of damages.Load test and non-destructive tests (brief description). NDT tests on damaged structuresuch as rebound hammer, ultrasonic pulse velocity, rebar locator, crack detection microscope,digital crack measuring

gauge.Chemical test - Chloride test, sulphate attack, carbonation test, pH measurement, resistivitymethod, Half-cell potential meter (Introduction and demonstration only).

MATERIALS FOR MAINTENANCE AND REPAIRS: Types of repair material, material selection.Essential parameters for maintenance and repair materials such - bond with substrate, durability.Waterproofing materials based on polymer modified cement slurry, UV resistant acrylicpolymer, ferro-cement.Repairing materials for masonry: plastic/aluminum nipples, non-shrink cement, polyesterputty or 1:3 cement sand mortar, galvanized steel wire fabrics and clamping rods, wire nails,ferro-cement plates.Repairing materials for RCC: epoxy resins, epoxy mortar, and cement mortar impregnated withpolypropylene, silicon, polymer concrete composites, sealants, fiber reinforcement concrete,emulsions and paints

MAINTENANCE AND REPAIR METHODS FOR MASONRY CONSTRUCTION: Causes of cracks in walls - bulging of wall, shrinkage, bonding, shear, tensile, vegetation.Probable crack location: junction of main and cross wall, junction of slab and wall, cracks inmasonry joints.Repair methods based on crack type - For minor & medium cracks (width 0.5 mm to 5mm):grouting and for major cracks (width more than 5mm): fixing mesh across cracks, RCC band,installing ferro-cement plates at corners, dowel bars, propping of load bearing.Remedial measures for dampness & efflorescence in wall.

MAINTENANCE AND REPAIR METHODS FOR RCC CONSTRUCTION: Repair stages such as concrete removal and surface preparation, fixing suitable formwork, bonding/passive coat and repair application, various methods of surface preparation.125 Civil Engineering Curriculum Structure. Repair options such as grouting, patch repairs, carbonated concrete, cleaning the corrodedsteel, concrete overlays, latex concrete, epoxy bonded mortar and concrete, polymer concrete, corrosion protection such as jacketingBuilding cracks and its prevention, common methods for dormant crack repairs such as Epoxyinjection, grooving and sealing, stitching, grouting andguniting/ shotcreting.Strengthening methods for live cracks such as addition of reinforcements, Jacketing, bracketscollars, supplementary members i.e. shoring, underpinning and propping of framed structure.

E. TEXT BOOKS

T1. Gahlot, P. S., Sharma, S., Building Repair and Maintenance Management, CBS Publishers & Distributors Pvt. Ltd., New Delhi

T2. Guha, P. K., Maintenance and Repairs of Buildings, New Central Book Agencies

F. REFERENCE BOOKS

R1. Hutchin Son, B. D., Maintenance and Repairs of Buildings, Newnes-Butterworth R2. Relevant BIS codes

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G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRE ON PROGR SPECIF OUTCO	ELATI WITH RAM FIC DMES
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Identify the type of maintenance needed for a given damaged structure.	1	2	2	1	3	1	-	-	-	2	3	2
[CO2]	Apply relevant method of retrofitting for re-strengthening of structures.	-	3	1	1	2	2	-	-	-	1	3	2
[CO3]	Assess causes of damages in various types of structure.	1	3	-	2	2	3	1	1	1	3	3	1
[CO4]	4] Select the relevant material for repair of the given structure.		3	1	2	3	2	-	-	1	2	3	2
[CO5]	Suggest relevant technique to restore the damages of the given structural elements.	-	2	2	1	3	2	-	-	1	2	2	2

Subject: Advanced Design of Structures

Code:DIP16252

3 Credits | Semester VI

A. Introduction:

- To understand the concepts involved in the design of riveted and welded connections.
- To know the provisions of BIS code for design of built up sections.
- To analyze T and L shaped beam sections.
- To understand the concept for design of one way and two way slabs.
- To identify short and long columns and their design provisions
- B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand the concepts involved in design of Steel and Reinforced Concrete structures.

- [CO2] Apply the provisions of BIS codes for design of structures.
- [CO3] Analyse T & L shaped beam section.
- [CO4] Select the most appropriate or economical section of RCC columns, slabs and footings.

[CO5] Design various steel connections & RCC columns, slabs and footings.

C. Assessment Plan:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

DESIGN OF CONNECTIONS IN STEEL STRUCTURES: Types of rivets, Riveted connections, Strength of riveted joints, Design of riveted joints foraxially loaded members. Types of weld, welded connections, Permissible stresses in weld, Strength of weld. Advantagesand disadvantages of weld, Design of fillet weld and butt weld for axial load Design of column bases for axially loaded columns only

STEEL BEAMS: Different steel sections, Simple and built up sections, Permissible bending stresses, Design of built up sections (symmetrical I section with cover plates only), check for shearand deflection. Introduction to plate girder: Components and functions (no numericals)

DESIGN OF RC FLANGED BEAM: General features of T and L beams, Advantages, Effective width as per BIS 456Design of singly reinforcement T beam, Stress and Straindiagram,

Depth of neutral axis, Moment of resistance, T and L beams with neutral axis in flange only.Simple numerical on location of neutral axis, Effective width of flange

DESIGN OF SLAB: Design of simply supported one-way slab for flexure, shear and deflection and checks, as perthe provisions of BIS 456Design of one-way cantilever slab, Chajjas, Flexure including checks for Development lengthand Shear stress Design of two-way simply supported slab,Introduction to design of doglegged staircases

DESIGN OF RCC COLUMN AND FOOTING DESIGN: UNI-AXIAL BENDING: IS 456

provisions, Column with uni-axial moment, Effective length calculations, MinimumeccentricityDesign of footing for axially loaded column only

E. TEXT BOOKS

- T1. Subramanian N., Design of Steel Structures, Oxford University Press.
- T2. Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.
- T3. Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill
- T4. Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning PrivateLimited, Delhi.

F. REFERENCE BOOKS

- R1. Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune.
- R2. Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co.,

R3. Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.

R4. Dayarathnam, P., Design of Steel Structures, S. Chand and Company, New Delhi. R5. Krishna Raju, and N.Pranesh, R.N., Reinforced Concrete Design Principles and Practice, NewAge International, Mumbai. AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	
[CO1]	Understand the concepts involved in design of Steel and Reinforced Concrete structures.	2	3	1	1	1	1	-	-	-	2	3	2	
[CO2]	Apply the provisions of BIS codes for design of structures.	1	3	-	-	1	-	-	-	-	3	3	2	
[CO3]	Analyse T & L shaped beam section.	-	3	-	-	1	-	-	-	-	2	3	1	
[CO4]	4] Select the most appropriate or economical section of RCC columns, slabs and footings.		3	2	2	2	1	1	-	-	2	3	2	
[CO5]	5] Design various steel connections & RCC columns, slabs and footings.		3	2	2	2	1	1	-	-	2	3	2	

Subject: Tendering and Accounts

Code: DIP16277 3 Credits | Semester VI

A. Introduction:

- To understand terminologies in contract and tender document and their significance.
- To know different types of contracts and their uses.
- To learn preparation of typical Tender documents for civil engineering work.
- To get acquainted with rent fixation and valuation of civil structures.

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Understand various types of contract and when they are used

[CO2] Suggest the relevant type of contract for the given civil engineering work.

[CO3] Prepare the typical Tender document for the given civil engineering work.

[CO4] Decide type of payment for the executed work.

[CO5] Justify the rent fixation and valuation of given civil structure

C. Assessment Plan:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

PROCEDURE TO EXECUTE THE WORK: Administrative approval, Technical sanction, budget provision, expenditure sanction. Methods for carrying out works- contract method, Departmental method -rate list method, piece work method, day's work method, employing labors on daily wages basis.

CONTRACTS: Definition of contract, objects of contract, requirements of contract, overview of Indian Contract Act. Types of engineering contract with advantages, disadvantages and their suitability - Lump sum contract, item rate contract, percentage rate contract, cost plus percentage, cost plus fixed fee,cost plus variable percentage and cost plus variable fee contract, labour contract, demolition contract, target contract, negotiated contract, Engineering

Procurement Construction Contract (EPC), Annuity Contract. Introduction of FIDIC Conditions of contract. Classification of contractor on basis of financial limits, Requirement of documents for registration of contractorBuild Operate Transfer (BOT) Project, BOT Toll contract, BOT (Annuity) contract, Design, Build, Finance, Operate and Transfer (DBFOT) contract, Hybrid Annuity contract, Operate Maintain and Transfer (OMT) contract, Operation & Maintenance contract

TENDER AND TENDER DOCUMENTS:Definition of tender, necessity of tender, types of tender- Local, Global, Limited. E -Tendering System – Online procedure of submission and opening of bids (Technical and Financial). Notice to invite tender (NIT)- Points to be included while drafting tender notice, Drafting of tender notice. Procedure of submitting filled tender Documents (Two envelope system), procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, letter of award.Meaning of terms - Earnest Money Deposit (EMD), Performance Security Deposit, Validity period, corrigendum to tender notice and its necessity, Unbalanced bid. Tender documents – Index, tender notice General instructions, special instructions, Schedule A, Schedule B, Schedule Terms related to tender documents – contract conditions- time limit, time extension, penalty, defective material and workmanship, termination of contract, suspension of work, Subletting of contract, extra items, price variation clause(escalation), defect liability Period, liquidated Damages Arbitration- Meaning, Qualification of an arbitrator, Appointment, Dispute and Settlement of disputes, Arbitration award

ACCOUNTS: Various account forms and their uses – Measurement Books, E- Measurement book (E-MB), Nominal Muster Roll(NMR), Imprest Cash, Indent, Invoice, Bill, Vouchers, Hand receipt Cash Book, Temporary Advance. Heads of AccountsMode of Payment to the contractor and its necessity -Interim Payment, Advance Payment Secured Advance, Petty advance, Mobilization advance, Running account bill, Final bill, Retention money, E - payment.

INTRODUCTION TO VALUATION: Definition and purpose of Valuation, role of valuer. Definition - Cost, Price and Value, Characteristics of Value, Factors Affecting Value. Types of Value - Book Value, Scrap Value, Salvage Value, Speculative Value, Distress Value, Market Value, monopoly Value, Sentimental Value. Factors affecting value. Depreciation, Obsolescence, Sinking Fund, Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, Constant Percentage Method.Fixation of rent, Lease – types of lease, lease hold property and free hold property. Mortgage – Mortgage deed, precautions to be taken while making mortgage.

E. TEXT BOOKS

T1. Datta, B. N., Estimating and Costing in Civil engineering, UBS Publishers Pvt. Ltd., New

Delhi

T2. Raina, V. K., Construction Management and Contract Practices, Shroff Publishers &Distributers Pvt. Ltd.

T3. Rangawala, S. C., Estimating and Costing, Charotar Publishing House PVT. LTD., Gujrat

T4. Birdie, G. S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd., New Delhi

F. REFERENCE BOOKS

R1. Patil, B. S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai

R2. Chakraborti, M., Estimating and Costing, Specification and Valuation in Civil Engineering, Monojit Chakraborti, Kolkata AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRE ON PROGE SPECIE OUTCO	ELATI WITH RAM FIC DMES
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	[CO1] Understand the dynamic role of entrepreneurship and small business.				-	2	-	1	1	1	1	2	3
[CO2]	CO2] Demonstrate the different Financial Planning & Control techniques.			1	-	-	-	1	1	1	1	2	3
[CO3]	Organize and manage small businesses.	1	-	1	-	-	-	1	1	1	1	2	3
[CO4]	Judge the different forms of ownership for small businesses.		-	1	-	-	-	2	1	1	2	1	3
[CO5]	Design an appropriate Strategic Marketing Plan for a business.	1	-	1	-	-	-	1	1	1	2	1	3

Subject: Entrepreneurship and Start-Ups

Code:DIP16265

4 Credits | Semester VI

A. Introduction:

- Acquiring Entrepreneurial spirit and resourcefulness.
- Familiarization with various uses of human resource for earning dignified means of living.
- Understanding the concept and process of entrepreneurship its contribution and role in the growth and development of individual and the nation.
- Acquiring entrepreneurial quality, competency, and motivation.
- Learning the process and skills of creation and management of entrepreneurial venture

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the dynamic role of entrepreneurship and small business.
- [CO2] Demonstrate the different Financial Planning & Control techniques.
- [CO3] Organize and manage small businesses.
- [CO4] Judge the different forms of ownership for small businesses.
- [CO5] Design an appropriate Strategic Marketing Plan for a business.

С.	Assessment	Plan:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

INTRODUCTION TO ENTREPRENEURSHIP AND START – UPS: Definitions, Traits of an entrepreneur, Entrepreneurship, MotivationTypes of Business Structures, Similarities/differences between entrepreneurs and managers.

BUSINESS IDEAS AND THEIR IMPLEMENTATION: Discovering ideas and visualizing the business, Activity map, Business Plan

IDEA TO START-UP: Market Analysis – Identifying the target market, Competition valuation and Strategy Development, Marketing and accounting, Risk analysis.

MANAGEMENT: Company's Organization Structure, Recruitment and management of talent. Financial organization and management.

FINANCING AND PROTECTION OF IDEAS: Financing methods available for start-ups in India, Communication of Ideas to potential investors – Investor PitchPatenting and LicensesExit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

E. TEXT BOOKS

- T1.The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company Steve Blank and Bob Dorf K & S Ranch ISBN 978-0984999392
- T2.The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Eric Ries Penguin UK ISBN 9780670921607
- T3.Demand: Creating What People Love Before They Know They Want It Adrian J. Slywotzky with Karl Weber Headline Book Publishing ISBN 978-0755388974

F. REFERENCE BOOKS

R1. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way Clayton M. Christensen

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G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRE ON PROGE SPECIE OUTCO	ELATI WITH RAM FIC DMES
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	CO1] Understand the dynamic role of entrepreneurship and small business.				-	2	-	1	1	1	1	2	3
[CO2]	CO2] Demonstrate the different Financial Planning & Control techniques.			1	-	-	-	1	1	1	1	2	3
[CO3]	Organize and manage small businesses.	1	-	1	-	-	-	1	1	1	1	2	3
[CO4]	Judge the different forms of ownership for small businesses.		-	1	-	-	-	2	1	1	2	1	3
[CO5]	Design an appropriate Strategic Marketing Plan for a business.	1	-	1	-	-	-	1	1	1	2	1	3

Subject: Project Management

Code: DIP16257

3 Credits | Semester VI

A. Introduction:

- To develop the idea of project plan, from defining and confirming the project goals and objectives,
- Identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Understand the importance of projects and its phases.
- [CO2] Apply crashing procedures for time and cost optimization.
- [CO3] Analyse projects from marketing, operational and financial perspectives.
- [CO4] Evaluate projects based on discount and non-discount methods.
- [CO5] Develop network diagrams for planning and execution of a given project.

C. Assessment Plan:

Criteria		Description	Maximum Marks
Continuous	Internal	Internal Examination	20
Assessment (CIA)		Attendance	5
		Assignment	5
End	Semester	End Semester Examination	70
Examination(ESE)			
Total			100
Attendance		A minimum of 75% Attendance	is required to be maintained by a
		student to be qualified for taking	up the End Semester examination.
		The allowance of 25% includes all	l types of leaves including medical
		leaves.	

D. SYLLABUS

CONCEPT OF A PROJECT: Classification of projects- importance of project management-Theproject life cycle- establishing project priorities (scope-cost-time)project priority matrixworkbreak down structure.

CAPITALBUDGETING PROCESS: Planning-Analysis-Selection-Financing-Implementation-Review.Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

FINANCIAL ESTIMATES AND PROJECTIONS: Cost of projects-means of financingestimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis **BASIC TECHNIQUES IN CAPITAL BUDGETING:** Non discounting and discounting methods- paybackperiod- Accounting rate of return-net present value-Benefit cost ratio internal rate of return.Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects.

PROJECT ADMINISTRATION: progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/costmechanisms. Determination of least cost duration. Post project evaluation. Introduction to variousProject management software.

E. TEXT BOOKS

- T1. Project planning, analysis, selection, implementation and review Prasannachandra Tata McGraw Hill
- T2. Project Management Gopala krishnan Mcmillan India Ltd.

F. REFERENCE BOOKS

R1.Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson – McGraw Hill

R2. Project management - David I Cleland - Mcgraw Hill International Edition, 1999

R3. Project Management-Harry-Maylor-Peason Publication

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G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRE ON PROGE SPECIE OUTCC	ELATI WITH RAM FIC DMES
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Understand the importance of projects and its phases.	2	-	1	-	2	-	2	3	3	2	2	3
[CO2]	Apply crashing procedures for time and cost optimization.	-	3	1	-	2	-	3	3	3	2	3	3
[CO3]	Analyse projects from marketing, operational and financial perspectives.	-	1	-	-	1	-	2	3	3	2	3	3
[CO4]	Evaluate projects based on discount and non-discount methods.	-	1	1	-	2	-	2	-	-	1	3	3
[CO5]	Develop network diagrams for planning and execution of a given project.	-	2	1	-	-	-	-	2	2	1	2	2

Subject: Disaster Management

Code: DIP16254

3 Credits | Semester VI

A. Introduction:

- To learn about various types of natural and man-made disasters.
- To know pre- and post-disaster management for some of the disasters.
- To know about various information and organisations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Get acquainted with basic information on various types of Disasters.
- **[CO2]** Apply the disaster concepts to management.
- **[CO3]** Analyse the relationship between Development and Disasters.
- **[CO4]** Decide the first action to be taken under various disasters.
- **[C05]** Formulate the precautions and awareness regarding various disasters and get familiarized with organization in India dealing with disasters.

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Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		student to be qualified for taking up the End Semester examination						
		The allowance of 25% includes all	l types of leaves including medical					
		leaves.						

D. SYLLABUS

UNDERSTANDING DISASTER: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management

TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS: Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire);Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters **DISASTER MANAGEMENT CYCLE AND FRAMEWORK:** Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Framework of Action.

DISASTER MANAGEMENT IN INDIA: Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

APPLICATIONSOFSCIENCEANDTECHNOLOGYFORDISASTERMANAGEMENT:Geo-informaticsinDisasterManagement (RS, GIS, GPS andRS).DisasterCommunicationSystem (EarlyWarning and Its Dissemination).Land UsePlanning and Development Regulations, DisasterSafe Designs and Constructions, Structural andNon Structural Mitigation of DisastersS&T Institutions for Disaster Management in India

E. TEXT BOOKS

T1. Ghosh, G. K., Disaster Management, A P H Publishing CorporationT2. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.T3. Alexander, David, Natural Disasters, Kluwer Academic London

F. REFERENCE BOOKS

R1. Publications of National Disaster Management Authority (NDMA) on Various Templates andGuidelines for Disaster Management

R2. Bhandani, R. K., An overview on natural &man-made disasters and their reduction, CSIR,New Delhi

R3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi

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G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	COF	REL	ATIO	N WIT	'H PR	OGRA	M OI	UTCO	MES	CORRELATI		
												ON	WITH
												PROGE	RAM
												SPECIE	IC
			•	•					•			OUTCO	OMES
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2
		1	2	3	4	5	6	7	8	9	10		
[CO1]	Get acquainted with basic information on various types of	2	2	-	1	2	-	-	1	2	3	2	1
	Disasters.												
[CO2]	Apply the disaster concepts to management.	2	3	-	2	2	-	1	2	1	2	2	1
[CO3]	Analyse the relationship between Development and	1	2	-	-	2	1	1	-	-	1	2	2
	Disasters.												
[CO4]	Decide the first action to be taken under various disasters.	2	3	1	2	3	-	-	2	2	3	3	2
[CO5]	Formulate the precautions and awareness regarding various	2	3	1	2	3	-	-	2	2	3	3	2
	disasters and get familiarized with organization in India												
	dealing with disasters.												

Subject: Operations Research

Code: DIP15240

3 Credits | Semester VI

A. Introduction:

• To provide a broad and in depth knowledge of a range of operation research models and techniques, which can be applied to a variety of industrial applications.

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Have in depth knowledge of a range of Operation Research models.
- [CO2] Implement the transportation problems at workplace.
- [CO3] Analyse and convert the problem into a mathematical model.
- [CO4] Select suitable methods for various games and apply the LP.
- [CO5] Formulate Linear Programming.

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance	is required to be maintained by a						
		student to be qualified for taking up the End Semester examination							
		The allowance of 25% includes all types of leaves including medi							
		leaves.							

D. SYLLABUS

INTRODUCTION: Development, Definition, Characteristics and phase of Scientific Method, Types of models; General methods for solving operations research models.

ALLOCATION: Introduction to linear programming formulation, graphical solution, Simplex Method, artificial variable technique, Duality principle. Sensitivity analysis.

TRANSPORTATION PROBLEM: Formulation optimal solution. Unbalanced transportation problems, Degeneracy. Assignment problem, Formulation optimal solution

SEQUENCING: Introduction, Terminology, notations and assumptions, problems with n-jobs and two machines, optimal sequence algorithm, problems with n-jobs and three machines

THEORY OF GAMES: Introduction, Two-person zero-sum games, The Maximum –Minimax principle, Games without saddle points – Mixed Strategies, 2 x n and m x 2 Games – Graphical solutions, Dominance property, Use of L.P. to games

E. TEXT BOOKS

T1. Operations Research: an introduction, Hamdy A. Taha, Pearson Education.

T2. Introduction to Operations Research: concept and cases, Frederick S. Hillier and Gerald J. Lieberman, Tata McGraw-Hill

F. REFERENCE BOOKS

R1. Operations. Research: theory and application, J.K. Sharma, Macmillan Publishers.

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G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES										CORRE ON PROGE SPECIE OUTCO	ELATI WITH RAM FIC OMES
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Have in depth knowledge of a range of Operation Research models.	2	-	1	1	-	-	-	2	2	-	1	1
[CO2]	Implement the transportation problems at workplace.	1	-	1	1	1	-	-	2	2	1	1	1
[CO3]	Analyse and convert the problem into a mathematical model.	3	-	1	1	-	-	-	2	2	1	1	1
[CO4]	Select suitable methods for various games and apply the LP	3	-	1	1	-	-	-	2	1	1	1	1
[CO5]	Formulate Linear Programming	3	-	1	1	-	-	-	2	1	1	1	1

Subject: Sustainable Development

Code:DIP16276 3 Credits | Semester VI

A. Introduction:

- To impart knowledge on the principles for balancing social, economic and environmental dimensions of development and the associated international and national frameworks
- B. Course Outcomes: At the end of the course, students will be able to
- [CO1] Define the principles of different sustainable development frameworks.
- [CO2] Apply the sustainable development principles during the planning of developmental activities.
- [CO3] Analyze various case studies in order to identify the determinants and indicators of sustainable development.
- [CO4] Address the national and global environmental, economic and social issues of different sustainable development framework.
- [CO5] Develop models on sustainable development.

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance is required to be maintained							
		student to be qualified for taking up the End Semester examinat							
		The allowance of 25% includes all types of leaves including me							
		leaves.							

D. SYLLABUS

INTRODUCTION:Status of environment – Environmental, Social and Economic issues – Need for sustainability – Nine ways to achieve sustainability – population, resources, development and environment

CHALLENGESOFSUSTAINABLEDEVELOPMENTANDGLOBALENVIRONMENTALISSUES:Concept of sustainability – Factors governingsustainable development – Linkages among sustainable development- Environment and poverty– Determinants of sustainable development – Case studies on sustainable development –Population, income and urbanization – Health care – Food, fisheries and agriculture – Materialsand energy flows

SUSTAINABLE DEVELOPMENT INDICATORS: Need for indicators – Statistical procedures – Aggregating indicators – Use of principal component analysis – Three environmental quality indices.

E. TEXT BOOKS

- T1.Sayer, J. and Campbell, B., "The Science of Sustainable Development: Local Livelihoods and the Global Environment" (Biological Conservation, Restoration &Sustainability), Cambridge University Press, London, 2003.
- T2. Peter P. Rogers, Kazi F. Jalal, John A. Boyd, "An introduction to sustainable development", Glen Educational Foundation, 2008

G. REFERENCE BOOKS

R1.. Kirkby, J., O"Keefe P. and Timberlake, "Sustainable Development", Earth scan Publication, London, 1993.

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	COF	REL	ATIO	N WIT	TH PR	OGRA	AM O	UTCO	MES		CORRE	ELATI	
													WITH	
												PROGRAM		
												SPECIFIC		
								•				OUTCO	DMES	
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2	
		1	2	3	4	5	6	7	8	9	10			
[CO1]	Define the principles of different sustainable development	2	2	1	1	3	3	1	1	1	2	3	2	
	frameworks.													
[CO2]	Apply the sustainable development principles during the	2	2	1	2	3	3	2	2	1	2	3	3	
	planning of developmental activities.													
[CO3]	Analyse various case studies in order to identify the	2	3	1	1	3	3	2	3	1	2	3	3	
	determinants and indicators of sustainable development.													
[CO4]	Address the national and global environmental, economic	2	3	1	2	3	3	1	2	1	2	3	3	
	and social issues of different sustainable development													
	framework.													
[CO5]	Develop models on sustainable development.	1	3	1	2	3	3	1	2	1	2	2	3	

Subject: Artificial Intelligence

Code:DIP16253

3Credits | Semester VI

A. Introduction:

• To introduce students to the domain of Artificial Intelligence

B. Course Outcomes: At the end of the course, students will be able to

[CO1] Give a general idea about Artificial Intelligence.

[CO2] Explore AI tools effectively.

[CO3] Analyse systems using Fuzzy Logic.

[CO4]Evaluate various search algorithms.

[CO5]Develop a simple Neural Network.

C. Assessment Plan:

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance is required to be maintained b student to be qualified for taking up the End Semester examinat							
		The allowance of 25% includes all types of leaves including me							
		leaves.							

D. SYLLABUS

INTRODUCTION TO ARTIFICIAL INTELLIGENCE: Artificial Intelligence (AI) definition, Goals of AI, History of AI, Applications of AI

AGENTS AND ENVIRONMENTS: Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents, Nature of Environments, Properties of Environments.

SEARCH ALGORITHMS: Terminology, Brute Force Search Strategies – Breadth First, Search, Depth First Search. Heuristic Search Strategies, Local Search Algorithms.

FUZZY LOGIC SYSTEMS: Introduction to Fuzzy Logic and Fuzzy systems, Membership functions, Fuzzification/Defuzzification

NEURAL NETWORKS: Basic structure of Neural Networks, Perceptron, Back-propagation

E. TEXT BOOKS

T1. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.

T2. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall

T3. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House

F. REFERENCE BOOKS

R1. Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial intelligenceuse casesDenis Rothman Packt PublishingISBN – 978-1788990547 R2. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and

Prospects of Artificial Intelligence, A K Peters/CRC Press

G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES									CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Give a general idea about Artificial Intelligence.	1	-	-	2	3	-	-	2	2	3	1	1
[CO2]	Explore AI tools effectively.	1	-	-	2	2	-	-	2	1	1	1	1
[CO3]	Analyse systems using Fuzzy Logic.	1	-	-	3	1	-	-	2	1	2	1	1
[CO4]	Evaluate various search algorithms.	1	-	1	3	2	-	-	2	1	1	1	1
[CO5]	Develop a simple Neural Network.	1	-	2	3	2	-	-	2	1	1	1	1

Subject: History of Science and Engineering

Code: DIP16255

3 Credits | Semester VI

A. Introduction:

- Know The Origin And Development Of Astronomy In Ancient India;
- Understand The Origin And Growth Of Mathematics In Ancient India.
- Assess The Growth Of Engineering In Ancient India.
- Identify The Evolution And Growth Of Medicine In Ancient India.
- List The Contributions Of India To The World In The Field Of Mathematics And Other Sciences
- B. Course Outcomes: At the end of the course, students will be able to
 - [CO1] Identify the evolution and growth of Science & Technology in India.
 - [CO2] Assess the growth of engineering in India.
 - [CO3] Compare the developments in Science & Technology during Medieval and Colonial India.
 - [CO4] Evaluate the contributions of Prominent Indian Scientists.
 - [CO5] Prepare a report on the roles of Civil Engineers in society.

C. Assessment Plan:

Criteria		Description	Maximum Marks					
Continuous	Internal	Internal Examination	20					
Assessment (CIA)		Attendance	5					
		Assignment	5					
End	Semester	End Semester Examination	70					
Examination(ESE)								
Total			100					
Attendance		A minimum of 75% Attendance	is required to be maintained by a					
		student to be qualified for taking up the End Semester examin						
		The allowance of 25% includes all	l types of leaves including medical					
		leaves.						

D. SYLLABUS

SCIENCE AND TECHNOLOGY: The Beginning Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine. Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India. Development of Geography: Geography in Ancient Indian Literature.

DEVELOPMENTS IN SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA: Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of maktabs, madrasas and karkhanas set up. Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine. Innovations in the field of agriculture - new crops introduced new techniques of irrigation **DEVELOPMENTS IN SCIENCE AND TECHNOLOGY IN COLONIAL INDIA:** Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company's Service. Indian Response to new Scientific Knowledge, Science and Technology in Modern India Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.

PROMINENT SCIENTIST OF INDIA SINCE BEGINNING AND THEIR ACHIEVEMENT: Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna.Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabha

E. TEXT BOOKS

- T1. Glimpses of India's Statistical Heritage, Edited by: J.K. Ghosh, S.K. Mitra, K.R. Parthasarathy, Wiley Eastern Limited, 1992.
- T2. Jagjit Singh, Some Eminent Indian Scientists, Publications Division, Ministry of Information and Broadcasting, Government of India, 1991.
- T3. Science and Technology in World History: An Introduction by J. E. I. McClellan and H. Dorn
- T4. The Timetables of Science: A Chronology of the Most Important People and Events in the History of Science by Alexander Hellemans and Bryan Bunch
- T5. Landmarks in Western Science: From Prehistory to the Atomic Age by Peter Whitfield
- T6. The Timetables of History: A Horizontal Linkage of People and Events by Bernard Grun, Daniel J. Boorstind

F. REFERENCE BOOKS

- R1. B.C. Berndt and R.A. Rankin, Ramanujan: Essays and Surveys, Hindustan Book Agency, 2003.
- R2. Robert Kanigel, The Man Who Knew Infinity, A Life of the Genius Ramanujan, Rupa & Co., 1992.
- R3. S.R. Ranganathan, Ramanujan: The Man and the Mathematician, London, 1967.
- R4. Subrata Dasgupta, Jagadish Chandra Bose and the Indian Response to Western Science, Oxford University Press, 1999

AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020 G. Course Articulation Matrix: (Mapping of COs with POs) **STATEMENT CORRELATION WITH PROGRAM OUTCOMES** CORRELATI CO ON WITH PROGRAM **SPECIFIC OUTCOMES** PO PO PO PO PO PO PO PO PO PSO 1 PSO 2 PO 5 3 4 7 8 9 1 2 6 10 [CO1] Identify the evolution and growth of Science & 2 3 3 -2 1 3 2 1 ---Technology in India. Assess the growth of engineering in India. [CO2] 2 3 2 1 3 2 2 1 2 1 --Compare the developments in Science & Technology 2 1 [CO3] 1 1 2 2 2 2 1 1 -during Medieval and Colonial India. Evaluate the contributions of Prominent Indian Scientists. [CO4] 3 2 1 1 1 3 2 2 1 1 --Prepare a report on the roles of Civil Engineers in society. [CO5] 2 2 2 2 2 1 1 1 1 --

Subject: Indian Constitution

Code: DIP16266 0 Credits | Semester VI

A. INTRODUCTION:

• The objective of the Constitution of India is to establish a society where there is Justice in social, economic and political. Liberty - thought, expression, faith, belief and worship.

B. COURSE OUTCOMES: By the end of this course, students will be able to:

- [CO1] Recall historical background of the Indian constitution.
- [CO2] Observe importance for building democratic India, the structure of Indian government, the structure of state government, the local Administration.
- [CO3] Develop the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

[CO4] Analyze the History, features of Indian constitution, the role of Governor and Chief Minister, of state election commission, decentralization of power between central, state and local self-Government.

[CO5] Assess Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women

[CO6] Create ideological framework relied upon by the framers of the Constitution of India, the system of government and role of judiciary by discussing and analyzing the rights and duties specified under the Constitution of India.

Criteria		Description	Maximum Marks						
Continuous	Internal	Internal Examination	20						
Assessment (CIA)		Attendance	5						
		Assignment	5						
End	Semester	End Semester Examination	70						
Examination(ESE)									
Total			100						
Attendance		A minimum of 75% Attendance is required to be maintained by							
		student to be qualified for taking up the End Semester examination.							
		The allowance of 25% includes all types of leaves including medica							
		leaves.							

C. ASSESSMENT PLAN:

D. SYLLABUS:

THE CONSTITUTION – INTRODUCTION:

The History of the Making of the Indian Constitution, Preamble and the Basic Structure, and its interpretation. Fundamental Rights and Duties and their interpretation, State Policy Principles

UNION GOVERNMENT:

Structure of the Indian Union, President – Role and Power, Prime Minister and Council of Ministers, Lok Sabha and Rajya Sabha

STATE GOVERNMENT:

Governor - Role and Power, Chief Minister and Council of Ministers, State Secretariat.

. LOCAL, DISTRICT& ZILA ADMINISTRATION:

Local Administration, District Administration, Municipal Corporation, Zila Panchayat.

ELECTION COMMISSION:

Election Commission Role and Functioning, Chief Election Commissioner, State Election Commission.

E. TEXT BOOKS

- T1. 'Indian Polity' by Laxmikanth
- T2. 'Indian Administration' by SubhashKashyap
- **T3.** 'Indian Constitution' by D.D. Basu
- T4. 'Indian Administration' by Avasti and Avasti

F. REFERENCE BOOKS

R1.Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008

R2. The Constitution of India B.L. FadiaSahityaBhawan; New edition (2017)

R3.Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition
G. Course Articulation Matrix: (Mapping of COs with POs)

СО	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES					CORRELATIO N WITH PROGRAM SPECIFIC OUTCOMES						
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
[CO1]	Recall historical background of the Indian constitution.					3	2	2					
[CO2]	Observe importance for building democratic India, the structure of Indian government, the structure of state government, the local Administration.					3	1	2					
[CO3]	Develop the knowledge on directive principle of state policy, the knowledge in strengthening of					3		2					
[CO4]	Analyze the History, features of Indian constitution, the role of Governor and Chief Minister, of government.					3		2		2			
[CO5]	Assess Preamble, Fundamental Rights and Duties ,Zilla Panchayat, block level organization,					3	2	2		2			
[CO6]	Create ideological framework relied upon by the framers of the Constitution of India, the system of government and role of judiciary by discussing and analyzing the rights and duties specified under the Constitution of India.					2		3					

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Public Health Engineering Lab

Code:

1 Credits | Semester VI

A. Introduction:

- To make the students good aware about water and its importance to human survival.
- Understand how to classify and analyses various quality parameters.

B. Course Outcomes: At the end of the course, students will be able to

- [CO1] Discuss about importance of water and its quality analysis.
- [CO2] Demonstrate different tests on accessing water quality and sewage characteristics.
- [CO3] Analyze various physico-chemical and biological parameters of water in case of quality requirements.
- [CO4] Suggest various types of treatment methods required to purify raw water with different contaminants.
- [CO5] Assess complete water quality assessment for EIA and domestic supplies.

C. Assessment Plan:

Criteria	Description	Maximum Marks				
Continuous Internal	Internal Examination	5				
Assessment (CIA)	Attendance	5				
	Assignment	5				
End Semester	End Semester Examination	35				
Examination(ESE)						
Total		50				
Attendance	A minimum of 75% Attendance is required to be maintained by					
	a student to be qualified for taking up the End Semester					
	examination. The allowance of 25% includes all types of leave					
	including medical leaves.					

D. SYLLABUS

Sl.No	Name of Practical					
l	Determine pH value of given sample of water.					
2	Determine the turbidity of the given sample of water.					
3	Determine residual chlorine in a given sample of water.					
4	Determine suspended, dissolved solids and total solids of given sample of water.					
5	Determine the dissolved oxygen in a sample of water.					
6	Undertake a field visit to water treatment plant and prepare a report.					
7	Determine the optimum dose of coagulant in a given raw water sample by jar test.					
8	Draw sketches of various valves used in water supply pipe line					

9	Draw a sketch of one pipe and two pipe system of plumbing
10	Determine B.O.D. of given sample of sewage.
11	Determine pH value of given sample of sewage.
12	Determine suspended solids dissolved and total solids for sample of sewage.
13	Determine the dissolved oxygen in the given sample of sewage.
14	Determine C.O.D. of given sample of sewage.

E. TEXT BOOKS

- T1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- T2. Peavy, H.S, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw Hill International Editions, New York 1985.
- T3. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication

F. REFERENCE BOOKS

R1. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.

R2. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tat McGraw-Hill, New Delhi.

R3. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi. R4. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development. AJU-Diploma in Civil Engineering - Syllabus w.e.f Batch 2020

F. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	COF	CORRELATION WITH PROGRAM OUTCOMES				CORRELATI						
												ON	WITH
												PROGRAM	
												SPECIE	IC
			-			_						OUTCOMES	
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO 1	PSO 2
		1	2	3	4	5	6	7	8	9	10		
[CO1]	Discuss about importance of water and its quality analysis.	2	1	-	3	2	-	-	-	1	2	2	1
[CO2]	Demonstrate different tests on accessing water quality and sewage characteristics.	1	3	1	2	3	2	-	-	-	2	2	1
[CO3]	Analyze various physico-chemical and biological parameters of water in case of quality requirements.	1	2	-	2	2	-	-	-	1	1	2	1
[CO4]	Suggest various types of treatment methods required to purify raw water with different contaminants	-	3	1	-	3	1	1	1	1	2	2	-
[CO5]	Assess complete water quality assessment for EIA and	-	3	2	3	3	3	-	1	-	-	2	2
	domestic supplies.												

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Subject: Seminar

Code:DIP16274

1 Credits | Semester VI

A. Introduction:

- The students with consultation with faculty adviser shall arrive at topic of seminar based on exhaustive literature review, current civil engineering scenario, latest techniques or materials etc.
- The students shall review available information and compile the information.
- The students shall prepare technical report.
- The students shall present their seminar to the review committee.
- The seminar topic shall be chosen during the 2nd week of the semester.
- The review and organizing the seminar shall be completed during 6th week.
- The seminar report shall be submitted during 10th week.
- The presentation will be held during 12th week.
 - The award of marks is based on the following criteria
 - Selection of Topic for the seminar and its relevance -10%
 - The quality of Seminar Report- 40%
 - Presentation skills and depth of knowledge 30%
 - Viva and discussion 20%

B. Course Outcomes:

The students will be able to:

[CO.1]. Appraise the current engineering research/ techniques / developments /interdisciplinary areas.

[CO.1]. Formulate seminar topic by utilizing technical resources/ Journals/ web sources.

[CO.1]. Carry out detailed review of available literature.

[CO.1]. Compose technical report.

[CO.1]. Demonstrate command of voice modulation, voice projection, and pacing duringpresentation.

C. Assessment Plan:

Criteria	Description	Maximum Marks				
Continuous Internal	Internal Examination	15				
Assessment (CIA)	Attendance					
	Assignment					
End Semester	End Semester Examination	35				
Examination(ESE)						
Total		50				
Attendance	A minimum of 75% Attendance is required to be maintained by					
	a student to be qualified for taking up the End Semester					
	examination. The allowance of 25% includes all types of leaves					
	including medical leaves.					

Subject:Major Project-II

Code: DIP16267

3 Credits | Semester V

A. Introduction: The objective of this course is to prepare students to use applications of the theory and practical learned during the course. It will also help students to develop an industry or research oriented project. This course helps students how to carry out project/studies in the field of interest of the student or as given by the industry.

B .Assessment Plan:

Criteria	Description	Maximum Marks				
Continuous Internal	Internal Examination	30				
Assessment (CIA)						
End Semester	End Semester Examination	70				
Examination(ESE)						
Total		100				
Attendance	Completion of Internship during the Summer vacation					

GUIDELINES FOR INTERNSHIP

Major Project-II should be based on real/live problems of the Industry/Govt./NGO/MSME/Rural Sector or an innovative idea having the potential of a Startup