SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Course: Diploma Branch: Civil Engineering Semester: Vth

Academic Session: 2024-2025 w.e.f: 02/09/2024

DCE051 Irrigation Engineering
Course Contents

Course Objectives:

1. To understand basic concepts of irrigation and water requirements of crops.
2. To understand the concepts of design of canal.
3. To learn about water logging
4. Be familiar with the concepts of river training.
5. To understand the concepts of reservoir planning.

Unit – I

Introduction: Definition Irrigation and irrigation engineering, advantages of irrigation, ill effects of over irrigation, and types of irrigation project purpose wise and administrative wise, Methods of irrigation. Analyze data for irrigation project, supervision of reservoir and canal structure, weir and barrages, lift irrigation scheme, its suitability, advantages and limitations Capacity of reservoir, Principle of Hydrology Relation between water and crop Rainfall, Crops, Dams Weir, Barrages, Area Capacity curve Capacity Canal Concept of runoff duty delta and base period

Unit –II

Hydrology: Hydrological cycle, Definition of rainfall , rain gauge and rain gauge station , types of rain gauges (names only) average annual rain fall and its calculation, definition of runoff, factor affecting run off, calculation of run off by runoff coefficient, English formula, Strange and binne tables and curves, Maximum flood discharge and method of calculation. Unit hydrograph Yield and Dependable yield and methods calculation

Water Requirement Of Crops Cropping seasons and crop in Madhya Pradesh, Definition Crop period base period Duty Delta , factors affecting Duty, relation between Duty Delta and base period Definition – CCA , GCA, IA, intensity of irrigation time factor capacity factor, Crop rotation, Problems on water requirement and capacity of canal. Assessment of irrigation water

Investigation And Reservoir Planning Survey for irrigation project data collected for irrigation project. Area capacity curve, silting of reservoir, rate of silting, factors affecting silting, methods to control levels and respective storage in reservoir. Fixing control levels

Unit – III

Dams And Spillways Types of dams, Earthen dams and Gravity dams (masonry and concrete) Comparison of Earthen and gravity dams with respect foundation, seepage, construction and maintenance Earthen Dams, Components and their function, typical cross section seepage through embankment and foundation seepage control though embankment and foundation, Methods of constructions, types of failure of earthen dams and remedial measures. Gravity Dams Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam Spillways.

Unit – IV

Small Irrigation Structure, Bandhara, Percolation Tanks And Lift Irrigation:

Advantages and disadvantages of Bandhara irrigation layout and component parts, solid and open Bandhara, Percolation Tanks, necessity and importance, selection of site, Layout of lift irrigation scheme, Irrigation department standard design and specification. Small irrigation structures, like Stop dam, stop dam cum cause way, ring bund, small ponds

Unit – V

Diversion Head Works Weir components parts, unction and types, layout of diversion head works its components and their function, canal head regular, silt excluders and silt ejectors, Barrages components and their function, difference between weir and barrage irrigation department standard design and specifications

Canals Classification of canals according to alignment and position in the canal network Design of most economical canal section, Canal lining, definition, purpose, types of canal lining advantages of canal lining properties of good canal lining material, CD. works- different C.D. works, canal falls, escapes, cross regulators and canal outlets.

Course Outcome:

CO1- Understand the principle of irrigation engineering.
CO2- Understand the term hydrology, cycles, rain gauges.
CO3- Analysis of dams, reservoir and spillways.
CO4- Understand the small irrigation structure.
CO5- Understand the diversion head work, canals.

Reference Books:

S.No.	Title	Author	Publisher
1	Irrigation and water power Engineering	B.C. Punmia	
2.	Introductory Irrigation Engineering	B.C. Punmia	Laxmi publication
3	Fundamental principle of Irrigation Engineering	V.B. Priyani	
4	Fundamental principles of Irrigation Engineering	Bharat Singh	

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DCE052 Quantity Surveying & Costing-I
Course Contents

Course Objectives:

1. To provide the student with the ability to estimate the quantities of item of works involved in buildings,
2. Water supply and sanitary works, road works and irrigation works,
3. To also to equip the student with the ability to do rate analysis,
4. Valuation of properties and preparation of reports for estimation of various items.

Unit – I

Overview of Estimating & Costing Meaning of the terms estimating, costing, Purpose of estimating and costing, Types of estimate - Approximate and Detailed, Approximate estimate Types, Plinth area rate method, Cubic Content method, Service Unit method, Typical bay method, Approximate Quantity method , Problems on Plinth area rate method & application of Service unit method for selection of service unit for different types of civil Engineering Structures, Types of detailed estimate Detailed estimate for new work. Revised estimate, Supplementary estimate, Revised & Supplementary estimate, Maintenance & Repair estimate. Uses of detailed estimate

Unit – II

Detailed Estimate Unit quantity method, Total quantity method, Data required for detailed estimate, Factors to be considered during preparation of detailed estimate, Specification, Quantity availability of material, Location of site, labor Component. Steps in preparing detailed estimate, taking out quantities, squaring, abstracting. Preparing checklist–by adoption of Sequence of execution drafting Brief Specification of items, contents of measurement sheet, Abstract sheet, face sheet.

Unit – III

Procedure For Preparing Detailed Estimate Procedure for taking out quantities for various item soft works by P.W.D & IS 1200 For Load bearing structure long wall and short wall method Center line method Framed Structure building by using thumb rules for reinforcement quantity calculation by preparing bar bending schedule Provisions in detailed estimate for contingencies, work charged establishment, Provisional items, Provisional Sum, Provision for water Supply & Sanitary works, Electrical wiring & installations charges, Tools & Plants, Prime cost, Day work.

Unit – IV

Rate Analysis Definition, Necessity of Valuation, definition Cost price, Value, Difference between them, Types of value, Book value, scrap value, salvage value, Market value, Depreciation, obsolescence, Sinking fund, Methods of calculation of depreciation, straight line method, sinking fund method constant percentage method, quantity survey method.

Computation of capitalized value, Gross income, outgoing, net income, Years purchase, Types of outgoing and their percentages. Valuation of Lands & Buildings, factors affecting their valuation, Fixation of Rent as per PWD practice.

Unit – V

Taking Out Quantities Of Work For Different Civil Engineering Works Roads, Dam, Canals, Railway embankments, methods of mean area, mid sectional area, trapezoidal, Prismoidal formula. Calculation of quantity of earthwork, Estimate of Road of 1km. length for pavement surface, WBM Bitumen Cement concrete road Use of software for estimation & for analysis of rates.

Course Outcome:

CO1 Understand the overview of estimating &costing
CO2 Understand the detailed estimate methods.
CO3 Analysis of preparation detailed estimste
CO4 Understand the rate analysis and valuation
CO5 Understand the work for various construction work.

Reference Books :

S.No.	Title	Author	Publisher
01	Estimating & costing in Civil Engineering	B.N. Datta	UBS Publishers Distributors Pvt. Ltd New Delhi
02	Estimating & costing, Specification and Valuation in Civil Engineering	M. Chakraborti ,Calcutta	
03	Estimating& costing	S.C. Rangwala Charotar	Publication Anand
04	Civil Engineering Estimating, Contract sand Accounts Vol.I	B.S. Patil Orient Longman, Mumbai	Standard Publication
05	Estimating & costing	G.S. Birdie	Dhanpat Rai and Sons Delhi

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DCE053 Work Organization & Management Scheme of Studies
Course Contents

Course Objectives:

1. Understand Project Life Cycle: Grasp the stages of a construction project from initiation to completion, including planning, design, execution, monitoring, and closure.
2. Learn Planning Techniques: Familiarize students with project planning tools and techniques, such as Gantt charts, critical path method (CPM), and program evaluation and review technique (PERT).
3. Resource Management: Develop skills in managing human, material, and financial resources to optimize project efficiency and effectiveness.
4. Risk Management: Identify potential risks in construction projects and learn strategies to mitigate them.

Unit – I

Procedure of Execution of work by P.W.D Organization of P.W.D. functions of their personnel. P.W.D. procedure of initiating the work administrative approval, technical sanction, budget provision, Method used in P.W.D. for carrying out works contract method and departmental method, Rate list method, piece work method, day's work method, department method.(NMR and casual muster roll),

Contract Definition of contract, objects of contract, requirements of valid contract. Types of engineering contract- 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, labor contract, demolition contract , fee contract, target contract, negotiated contract. Class of contractor, Registration of contractor, BOT Project,

Unit – II

Tender &Tender documents Definition of Tender, necessity of Tender, Types of Local & Global, Tender Notice, points to be included while drafting Tender Notice, Drafting of Tender Notice. Meaning of terms: Earnest money, security deposit, validity period, right to reject one or all tenders, corrigendum to tender notice and its necessary. Tender documents – List, scheduled A, Schedule B, Schedule C. 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 it, price variation clause, defect liability period, liquidated and un liquidated damages. Filling the tender by contractor and points to be observed by hi,. Procedure of submitting filled in Tender document. Procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, acceptance letter and work order.

Unit – III Accounts of P.W.D. Various Accounts Forms and their uses – measurement, Books, Nominal Muster Roll, Imprest Cash, indent, Invoice, Bills, Vouchers, Cash

Book, Temporary advance

Payment to Contractors Mode of payment to the contractor, Interim payment and its necessity, Advance payment, secured advance, on account payment, Final payment, first and final payment, retention money, reduced rate payment, petty advance, mobilization advanc

Unit – IV Specifications Necessity and importance of specifications of an items, points to be observed in framing specifications of an item, types of specification. Brief and detailed, standard and manufacturers specifications, Preparing detailed specifications of items in Civil engineering works, standards specification book, Legal aspects of specification,

Cash, Bills, Auction & T.A. Rules Procedure to settle account of money received, modes of payment, permanent and temporary advance, comparison, checking of bills and vouchers, auction procedure, T.A. rules etc.

Unit – V Time Schedule For Works Importance of management of works Gantt bar chart, limitation of chart, CPM network, project chart

Miscellaneous Necessity of maintaining daily dairy, need for presence of sub engineer, A/R & S/R , charge to be handled to be cash transferred, inspection of rest houses. Measures to improve the efficiency of labour, causes of accident, trade unions, aims of labour legislation, labour courts, attitudes of sectional officers towards labour

Visits:

1. Visit to public sector/Govt. Industry/ Organization. like PWD,RES,
2. Visit to private sector Industry.

Course Outcome:

CO1 Understand the procedure of execution of pwd
CO2 Understand the tender and tender documents.
CO3 Understand the accounts of pwd
CO4 Understand the specification of projects
CO5 Understand the time schedule for construction work

Reference Book:

S.No.	Title	Author	Publisher
01	A.B.C. of PWD Accounts	C.M.Kaul	
02	Over see accounts & Duties	Kumar	
03	PWD Managements, Accounts&LabourRelation	H.S.Pandit	
04	ManualofLabourRelations	R.C.Shrivastava	
05	CivilEngineering management	O.N.Wakhle,	D.K.Publisher
06	Estimating&costing incivilEng	B.N.Datta	USBPublisher
07	Estimating& costing	G.S.Birdie	Dhanpatrai&son

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DCE054 Railway Bridge & Tunnel
Course Contents

Course Objectives:

1. Students will learn the fundamental principles of structural engineering as they apply to rail bridge and tunnel design.
2. The course will cover relevant design codes, safety standards, and regulations specific to rail infrastructure.
3. How to measure the compaction and permeability of soil by lab experiments theoretically uses of Darcy law. Two dimensions flow and develop flow net and characteristics.
4. The course will explore various construction methods used in building rail bridges and tunnels, including traditional and innovative techniques.

Unit-I

Overview Of Transportation Engineering: Role of transportation in the development of nation. Modes of transportation system – roads, railway, airways, waterways, Importance of each mode, comparison and their relative merits and demerits, Necessity & importance of Cross drainage works for roads & railways,

Unit-II

Railway Engineering: Alignment and Gauges, Classification of Indian Railways, zones of Indian Railway. Alignment- Factors governing rail alignment, Rail Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG & M.G Single & double line in cutting and embankment, Permanent way

Unit-III

Ideal Requirement And Component Parts: Rails function & its types. Rail Joints –requirements, types, Creep of rail –causes & prevention of creep. Sleepers –functions & Requirement, types – wooden, metal, concrete sleepers & their suitability, sleeper density. Ballast – function & different types with their properties, relative merits & demerits, Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers. Railway Track Geometrics, Coning of wheels, tilting of rails, Gradient & its types, Super elevation, limits of Super elevation on curves, Cant deficiency, negative cant, grade compensation on curves. Branching of Tracks, Definition of point & crossing, a simple split switch turnout consisting of points and crossing lines. Sketch showing different components, their functions & working. Line sketches of track junctions-crossovers, scissor cross over, diamond crossing, triangle. Inspection of points and crossings, Station and Yards : Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction & terminal) Station yards , types of station yard, Passenger yards, Goods yard Locomotive yard, its requirements, water column, Marshalling

Unit-IV

Bridge Engineering: Site selection and investigation Factors affecting selection of site of a

bridge. Bridge alignment Collection of design data Classification of bridges according to function, material, span, size, alignment, position of HFL. Component parts of bridge. Plan & sectional elevation of bridge showing component parts of substructure & super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types Piers-function, requirements, types. Abutment – function, types, Wing walls – functions and types. Bearing – functions, types of bearing for RCC & steel bridges. Approaches–in cutting and embankment. Bridge flooring-open and solid floors. Permanent and Temporary Bridges-Permanent Bridges -Sketches& description in brief of culverts, causeways, masonry, arch, steel, movable steel bridges, RCC girder bridge, pre-stressed girder bridge, cantilever, suspension bridge. Temporary Bridges-timber, flying, floating bridges Inspection & Maintenance Of Bridge - Inspection of bridges, Maintenance of bridges & types, routine & special maintenance

Unit-V

Tunnel Engineering: Definition, necessity, advantages, disadvantages. classification of tunnels, Shape and Size of tunnels, Tunnel Cross sections for highway and railways Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel, Shaft - its purpose & construction. Methods of tunneling in Soft rock -needle beam method, fore-poling method, line plate method, shield method. Methods of tunnelling in Hard rock – Full face heading method, Heading and bench method, drift method. Precautions in construction of tunnels Drilling equipments-drills and drills carrying equipments, Types of explosives used in tunnellin. Tunnel lining and ventilation.

Course Outcome:

CO1 Understand the overview of transportation engineering.
CO2 Understand the alignments of railways
CO3 Understand the ideal requirements of railway tracks.
CO4 Understand the bridge engineering.
CO5 Understand the tunnel engineering.

Reference Books:

Sr. No.	Title	Author	Publisher
1	Railway Engineering,	S.C .Saxena	Dhanpatra i&sons
2.	Railway Track	K.R. Antia,	TheNewBookCo. Pvt. Ltd Mumbai
3	Principles of Railway Engineering	S.C. Rangwala,	Charotar Publication.
4	Principles and Practice of Bridge Engineering,	S.P. Bindra	Dhanpatrai&sons.
5	Bridge Engineering	D.R. Phatak,	Everest Publisher
6	Elements of Bridges,	D. Johnos Victer,	Oxford&IBH Publishingco.

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DCE055 Structural Design & Drafting – I (RCC)
Course Contents

Course Objectives:

1. To educate the student about the concept of reinforced cement concrete and different method of design of reinforced concrete.
2. To educate the student about concept of working stress method to analysis and design of beams.
3. To educate the student about concept of limit state method to analysis and design of beams, slabs and columns.
4. To educate the student about analysis and design of footings and staircases by limit state method.

Unit-I

Introduction To RCC: S.I. Units, Meaning of R.C.C. purpose of reinforcement, Materials of reinforcement steel as a reinforcing material. Types of steel used for reinforcement mild steel, To steel, permissible stresses in concrete and steel. Different mixes of concrete to be used for R.C.C. work use of I.S. codeNo.456-2000andI.S.875-1984fordesigningR.C.C.structures.

Fixed & Continuous Beam: Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam, Fixed end moments from first principle for beam subjected to UDL over entire span, central point load, Point load of mid span. Application of standard formula, finding moments and drawing S.F. and B.M. diagrams for a fixed beam. Clapevron's theorem of three moment (noderivation).Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF and BM diagrams for continuous beams

Unit –II

Working Stress Method & Pre Stressed Concrete Introduction to reinforced concrete, R.C. Sections their behavior, grades of concrete steel. Permissible stresses, Assumptions in W.S.M. Equivalent bending stress distribution diagram for singly reinforced section, Concept of under-reinforced, over-reinforced and balanced section, neutral axis co-efficient Simple numerical problems on determining design constants, moment of resistance and area of steel for singly & doubly reinforced beam. Concept of pre stressed concrete, externally and internally prestress member. Advantages and disadvantages of pre stressed concrete. Methods of pre stressing, pre tensioning and post tensioning, Losses in pre stressing.(No numerical problems shall be asked in written examination on pre-stressed concrete).

Unit –III

Limit State Method Definition, types of limit states, partial safety factors for materials

strength, characteristics strength, characteristics load, design load. Loading on structures per I.S. 875 I.S. Specification regarding spacing of reinforcement in slab cover to reinforcement in slab, beam column & footing, minimum reinforcement in slab, beam & column, lapping, anchoring effective span for beam& slab.

Unit – IV

Analysis And Design Of Singly Reinforced Sections (LSM) Limit State of collapse (Flexure), Assumptions stress. Strain relation ship for concrete and steel neutral axis, Stress block diagram and Strain diagram for singly reinforced section. Concept of under-reinforced, over-reinforced and balanced section, neutral axis co-efficient, limiting value of moment of resistance and limiting percentage of steel required for balanced singly R.C. Section. Simple numerical problems on determining design constants, moment of resistance and area of steel.

Analysis And Design Of Doubly Reinforced Sections (LSM) General features, necessity of providing doubly reinforced section reinforcement limitations. Analysis of doubly reinforced section, strain diagram stress diagram, depth of neutral axis, moment of resistance of the section. Simple numerical problems on finding moment of resistance and design of beam sections,

Unit – V

Shear, Bond And Development Length(LSM) Nominal Shear stress in R.C. Section, design shear strength of concrete, Maximum shear stress, Design of shear reinforcement, Minimum shear reinforcement, forms of shear reinforcement. Bond and types of bond, Bond Stress, check for bond stress, Development length in tension and compression, anchorage value of hooks 90° bend and 45° bend Standard Lapping of bars ,check for development length, Simple numerical problems on deciding whether shear reinforcement is required or not, check for adequacy of the section in shear. Design of shear reinforcement; Minimum shear reinforcement in beams; Determination of Development length required for tension reinforcement of cantilevers beams and slab, check for development length.

Course Outcome:

CO1 Understand the introduction of RCC
CO2 Analysis of WSM and PSC method
CO3 Analysis of LSM method
CO4 Analysis of singly reinforced beam.
CO5 Analysis of shear bond and development length.

Reference Books:

S. No.	Authors	Title	Publisher
01	Dr.V.L.Shah & Late Dr. S.R.Karve.	Limit State Theory & Design of Reinforced Concrete.	Structure Publications
02	N.C. Sihna& S.K. Roy	Fundamentals of Reinforced concrete.	S. Chand & Company
03	S.U. Pillai & DevdasMenon	Reinforced concrete Design	Tata Mcgraw Hill.
04	P.C.Varghase	Limit State Design of Reinforced Concrete.	Prentice Hall of India.

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DCE052P Quantity Surveying & Costing-II

List of Experiment:

1. Use of different Schedule of Rates like .PWD.C.P.W.D., D.S.R.,RES, HOUSING BOARD ,IRRIGATION & PHE
2. Estimating & abstract and rate analysis with the help of different software eg. QE-PRO, ESTIMATOR, & Print out of report.
3. Taking out quantities of following items for small R.C.C. Hall Concreting for footing, Column, Beam, slab, Reinforcement for above items by preparing Schedule of bars, Form work for all above items,
4. Preparing Rate analysis of following items: Building work – Brick work, P.C.C., R.C.C., Plastering, Flooring, Doors, Windows
5. Taking out quantities of Steel work for given shed supported on steel
6. trusses & having GI sheet/profile sheet roofing.
7. Taking out quantities of work for pipe culvert.
8. Drawings shall be provided for the above exercises by subject teacher.

All experiment works calculation are calculated in MS office / Excel

Reference Books:

SR.NO	Title	Author	Publisher
1	Quantity surveying & costing lab Manual for civil engineering.	H.S. Moondra Rajiv Gupta	
2	Estimating & costing in Civil Engineering	S.C. Rangwala Charotar	
3.	Civil Engineering Estimating, Contract sand Accounts Vol. I	B.S. Patil Orient Longman, Mumbai	
4	Cost management of construction projects.	Donald toway	
5	Estimating & costing	B.N, DUTTA	USB PUBLISH

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DCE055P STRUCTURAL DESIGN & DRAFTING –I (RCC) LAB

List of Experiments:

- Sketch book consists of approximately ten plates from R.C.C. Design shall include important information of clauses of IS 456-2000 code.
- Typical sketches of components members/stress distribution & strain distribution diagrams R.C.C. section /detailing of reinforcement in joints /members.
- Design of R.C.C structural components by LSM. Introduction to RCC design software STRUUDS
- Thestudentsshouldmakedetailedsimpledesignanddrawingofreinforcement detailingontwofullimperialsizesheetsfinishedinpencilonanyfiveofthefollowing
- R.C.C. components members of a two-storied building with detailing of reinforcement(G+1) at the joints as per requirements &IS 13920.

1. One-way simply supported slab.
2. Two-way simply supported slab.
3.

Reference Books:

S. NO	TITLE	AUTHOR	PUBLISH
1	Limit State Theory & Design of Reinforced Concrete.	Dr VL.Shah & Late Dr.S.R.Karve.	Structure Publications
2	R.C.C DESIGN BY BC PUNMIYA 3rd EDITION	A.K JAIN ASHOK KUMAR JAIN	
3	R.C.C. DESIGN 4TH EDITION	PILLAI &MENON	

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DCE056P FIELD VISIT/ SURVEY CAMP

FIELDVISITS–

1. Visit to a construction site where the RCC work is in progress.
2. Visit to a construction site where the irrigation work is in progress.
3. Visit to a bridge site.
4. Visit Batching plant for cement concrete and bituminous road
5. Visit to water treatment plant. Visit to a dam site Canal site .Visit for a power plant site .
6. Visit for a construction site where multi storied mal / shoping complex

PREPARATION OFDEATAILED FIELD VISITREPORT WITH PHOTOS

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DCE058P MINOR PROJECT

Course Contents

1. **Introduction:** Importance of project work, guideline and general introduction
2. **Selection of Project**: The project can be selected from any four civil engineering system like Building construction system ,transportation
   Engineering system, irrigation engineering system, A topic for project can also be selected on recent development in civil engineering.
3. **The project report shall be in the following format:**

- Topic and objectives
- Collection of data, required survey work,
- Management and construction procedure
- Resources scheduling and networking
- Conclusion

LIST OF CIVIL ENGINEERNG PROJECTS:

1. Design of Check Dam/ Stop Dam.
2. Study of Dam(Earthen/Gravity)
3. Micro irrigation–Drip/Sprinkler Irrigation.
4. Junction planning for city roads /planning for roads for congested area/parking
5. Studies etc.
6. Interior decoration.
7. Concrete mix design.
8. Solid waste management.
9. Hospital waste disposal.
10. Recycling of resources.
11. Manufacturing of Precast concrete products.
12. Prestressed concrete.
13. Planning Estimating and design for residential lapartments / commercial complex.

Term Work: Shall consist Detailed project report in above format.