Price:- 15/- Rs.

॥ अंतरी पेटवू ज्ञानज्योत ॥

North Maharashtra University, Jalgaon

Syllabus for Fourth Year Engineering Degree Course (B.E.)

CIVIL

w.e.f. July,2001

North Maharashtra University, Jalgaon

B.E. (CIVIL)
Term I

Sr. No	Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
			Lectures	Practical	Paper Duration Hours	Maximum Marks			
						Paper	TW	PR	OR
1	402001	QUANTITY SURVEYING & VALUATION	4	2		100	25	-	25
2	402002	NUMERICAL ANALYSIS & COMPUTER APPLICATION	4	4		100	25	-	25
3	402003	ENVIRONMENTAL ENGINEERING	4	2 (Alternate)		100	25	-	-
4	402004	ELECTIVE -I	4	2		100	25	-	25
5	402005	SEMINAR	-	2		-	25	-	25
5	402006	PROJECT	-	2		-	50	-	-
		Total	16	14	-	400	175	-	100
		Grand Total	30		-	675			

List of Electives for B.E. (Civil Engineering) New Course

402004 ELECTIVE-I

1] Watershed Management
2] Earthquake Resistant Design
3] Remote Sensing in Civil Engineering
4] Earth Structures
5] Open Channel and Conduit Flow
6] Low Cost Construction Techniques and Rural Development.

Term II

Sr. No	Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
			Lectures	Practical	Paper Duration Hours	Maximum Marks			
						Paper	TW	PR	OR
1	402007	DAMS & HYDRAULIC STRUCTURES	4	2		100	25	-	25
2	402008	ANALYSIS & DESIGN OF SPECIAL STRUCTURES	4	4		100	25	-	25
3	402009	CONSTRUCTION MANAGEMENT	4	2		100	25	-	-
4	402010	ELECTIVE-II	4	2		100	25	-	25
5	402011	TECHNICAL VISIT	-	-		-	50	-	-
6	402012	PROJECT	-	2	-	-	50	50	-
		Total	16	12	-	400	200	50	75
		Grand Total	28		-	725			

List of Electives for B.E. (Civil Engineering) New Course

402010 ELECTIVE-II

1] Advanced Highway Engineering
2] Finite Element Method
3] Systems Approach in Civil Engineering
4] Water Power Engineering
5] Industrial Water Pollution and its Control
6] Land Development and Drainage Engineering

TERM FIRST

402001   QUANTITY SURVEYING & VALUATION

Lectures : 4 Hours/Week	Theory Paper : 100 Marks
Practicals : 2 Hours/Week	Duration : 4 Hours
Term Work : 25 Marks	Oral : 25 Marks

Unit 1

Estimate, Definition, Importance, Purposes, data required for estimation of various Civil Engg. Works.

Units of measurements, taking out quantities, methods of taking out quantities, abstracting, provisional sum, Prime cost items, contingencies, work charge establishment, centage charges.

Approximate estimate, purposes, methods, approximate estimates of various civil engg. works, building cost index, revised estimate, supplementary estimate, revised and supplementary estimate.

Specifications, definition, purposes, types, drafting of specifications, legal aspects, specifications of a few main items of civil engg. works.

Method of execution of work in contracting system and employing labour, administrative approval, technical sanction, expenditure sanction, PWD procedure of estimate.

Unit 2

Detailed estimate of building by various methods (load bearing and framed structure)

Detailed estimate of community well, septic tank, Culvert etc. reinforcement quantities of R.C. elements like slab, beam, column, footing etc.

Unit 3

Task work, definition and purposes, factors affecting task work, current/dept. schedule of rate, task work, various items of construction.

Analysis of rates, factors affecting cost of an item of work, material, labour etc. Analysis of rates of various items of construction.

Depreciation, definition and its meaning, various methods of depreciation, sinking fund, book value, free hold and lease hold properties.

Unit 4

Valuation, purposes, price cost and value, nature of value, factors affecting value of a property, mortgage, various types of value like market value, sentimental value etc. Year's purchase and outgoings, legal aspects of valuation and easement act. Methods of valuation, Land and building method, rental method etc. Belting method of valuation of land. Standard rent and rent fixation.

Unit 5

Contract essentials, types, registration and law of contract, free consent, contract documents, performance of contract, breach of contact, advances to contractor, Bills of contract and payments, subletting, inspection of works. Tender, Tender Notice, Various terms used in tender notice, such as SD, EMD, Estimated cost, Time period of work, Cost of tender form, invitation of tender, Time schedule of calling of tender, tender documents, Two envelopes system, Scrutiny and acceptance, Revocation of tender, extra items, additions and alteration, defect liability, liquidation and unliquidated damages , escalation of rates, work order .

Term Work : It shall consist of following :
----

1) Units of Measurement of Various items of Civil Engg. works.

2) Approximate Estimate of :

   i) Residential Building

   ii) Public Building

   iii) Elevated water reservoir

   iv) One irrigation project

   v) Road and Bridges

3) Detailed estimate of a load bearing structure (single storey) of area not less than 70 sqm.

4) Detailed estimate of framed structure double storey of area minimum to 70 sqm. at each floor.

5) Detailed estimate of any two of the following :

a) Community well

b) Culvert

c) Septic tank

d) Earth work

6) Specifications for any 8 items of construction

7) Rate analysis for :

   i) PCC

   ii) Brick work

   iii) Plastering

   iv) Pointing

   v) Stone masonry

   vi) 25 mm mosaic tile floor over 75 mm lime concrete

   vii) Panelled door

viii) 25 mm thick DPC of 1:1.5:3 cement concrete

8) Valuation of a building

9) Estimation of quantities of reinforcement for any two of the following :

   i) Slab

   ii) Beam

   iii) Column and Column base

Books recommended
----
1) Estimating and Costing by B.N. Dutta
2) Estimating and Costing by Chatrobotry
3) Estimating and Costing by G.S. Birdie
4) Estimating and Costing by Patil
5) Valuation by Rangwala

402002 NUMERICAL METHODS AND COMPUTER APPLICATION

Lectures : 04 hours/week	Theory paper :- 100 marks
Practical : 04 hours/week	Duration :- 3 hours
Term-work : 25 marks.	Oral :- 25 marks

UNIT-I

(A) Errors and Approximation in Numerical Computation :- Introduction, storage of integers and real numbers in computer, error due to storage, approximation, truncation errors, round off errors, absolute and percentage error.

(B) Solution of simultaneous algebraic equations:- Introduction, solution of Simultaneous equations by matrix inverse method, Gauss-elimination method, Gauss Seidel method, Gauss-Jordan method, partial pivoting, Method of Iteration and its condition for convergencies, introduction to Eigen value problem.

UNIT-II

(A) Linear Programming :

Introduction, mathematical formulation of linear programming problem (L.P.P.), Characteristics of L.P.P. standard form of L.P.P., solution of L.P.P. by graphical and simplex method. Introduction to artificial variables (No mathematical treatment)

(B) Solution of linear algebraic and transcendental equations : Introduction, method of simple iteration, bisection, false position, Newton- Raphson method, generalized Newton's method.

UNIT-III

(A) Interpolation and curve Fitting

Linear and Quadratic interpolation, Newton's forward and backward interpolation, Lagrange interpolation, Method of least square, fitting straight line and Non linear curve.

(B) Probability distribution, Co-relation and Regression Analysis Introduction, Normal, Gamma and Poisson distribution, Co-relations, test of significance, the chi-square (x2) test, degree of co-relation, acceptance limit etc.

UNIT - IV

(A) Solution of ordinary differential equation :

Taylor's series method, Euler's method, modified Euler's method, Runga- Kutta method, Predictor Corrector method.

(B) Numerical Integration :

Trapezoidal rule, Simpson's one third and three-eight rule, Gauss-Quadrature technique, Lagrange's formula.

UNIT - V

(A) Partial differential equations :

Introduction to initial value and boundary value problem, Introduction to P.D.E. approximations, Explicit and Implicit finite difference methods for the solution of one dimensional wave equation and Two dimensional (Parabolic and Elliptic) and higher order P.D.E.

(B) Finite Element Method :

Introduction, concept of finite element, classification of element for discrete and continuum structure, characteristics of an element, Displacement function, General approach for formulation of element stiffness matrix Advantage and disadvantage of F.E.M.

TERM-WORK :-

The term work shall consist of computer programs written in FORTRAN 77 or 'C' or any latest language for different problems. Each solution shall include algorithm, flowchart, explanation of test problem, printout.

The Details of software/s used for editing, compiling and running the programme may be mentioned in journal.

At least one assignment should be solved from each of five groups mentioned below and total eight assignment based on computer programming and method should be solved.

Group (1)

(A) Addition, Subtraction and multiplication of matrices or inverse of matrix

(B) Gauss elimination method or Gauss-Jordan elimination method or Gauss-Seidal method

Group (2)

(A) Program on method of bisection or method of false position

(B) Newton- Raphson or method of simple iteration

(C) Program on L.P.P., graphical and simplex method

Group (3)

(A) Method of least square or Newton's forward and backward interpolation or Lagrange interpolation

(B) Fitting straight line and parabola.

Group (4)

(A) Euler's method or modified Euler's method or Runga - Kutta method

Group (5)

(A) Simpson's one third and three eight rule or Lagrange's formula or Gaussian quadrature rule.

(B) Concept of F.E.M, formulation of problems

Book Recommended :
----

(1)   " Numerical Method in FORTRAN" Mc Cormick and Salvadori

      Prentice Hall of India Pvt. Ltd. New Delhi.

(2)   " Numerical Method in Science and Engg." S.Rajasekaran

      A.H. Whealer and Company Ltd.

(3)   " Numerical Method in Science and Engg."

      Stanton   Ralph G.

      Prentice Hall of India Pvt. Ltd. New Delhi.

(4)   " Introduction Methods of Numerical Analysis,

      S.S.Sastry

      Prentice Hall of India Pvt. Ltd. New Delhi.

(5)   " Numerical Method of Engineers"

      Stephans Chapra and Caunals, Mc Graw Hill.

(6)   " Statistics (Theory and application)

      Sancheti and Kapoor

      Sultan Chand and Sons New Delhi
(7) " Numerical Solution of Differential Equation "

      M.K.Jain New Age (I) Pub Pvt. Ltd.

(8)   " Numerical Method for initial and Boundary value

      problems" S. Raje Sekaran, A.H. Wheeler's and Company Ltd.

(9)   " Optimization theory and application " S.S. Rao Wiley

      Eastern Limited

(10) " Operation Research" by Kanti swarup and P.K. Gupta

      Sultan Chand and Sons New Delhi.

(11) " Introduction to Finite Element Method "

      C.S.Desai and J.F. Abel.

(12 " An Introduction to the Finite Element Method"

      J.N. Reddy

Note:- Question should not be set on programming in theory Exam.

      The Question should be limited upto algorithm or flow chart.

O

402003   ENVIRONMENTAL ENGINEERING

Lectures   : 04 hours/week   Theory paper:- 100 marks
                      alternate
Practical/TW : 02 hours/week   Term-work   : 25 marks.

UNIT-I

AIR POLLUTION Definition, Scope, Classification of Pollutants,
Natural   Pollutants,   Particulate,   Gases   and   Vapours,
Transport   Diffusion formulae for stack height,   Urban
Diffusion Models (use of only formulae,no mathematical
treatment) for finding out Ground Level Concentration,
Introduction to Air Sampling and Analysis, Effects of Air
Pollution on Man, Vegetation, Property, and Animals, Control
of   air   pollution   (only   introduction)   by   Process
Modification, Change of Raw Materials, Fuels,   Process
Equipment, Design, Introduction to legislation and
Regulation, Green House Effect, Ozone Depletion, Acid Rains.

UNIT-II

ENVIRONMENTAL IMPACT ASSESSMENT and MANAGEMENT :- Prediction and
Assessment of Environmental Impact due to Air, Water, Noise
Pollution, Solid Waste, Toxical Hazardous Waste, Various
Methods of Environmental Impact Analysis, Their Usage,
Advantages and Disadvantages.

Framework for Environmental Assessment, Description   of
existing environmental setting, Disaster Management, Impact
on Social-economic and Cultural Environment Environment
Audit Concept, Case studies of EIA for Highways, Dams and
Urbanization

UNIT-III

Solid Waste - Sources, Nature and Characteristics, Quantities and
Qualities, Rates of Generation and Factors affecting them,
Potential of Diseases, Nuisances and other Problems due to
solid wastes

Solid Waste Management :- Generation,Onsite Storage, Collection, Separation, Processing and disposal

Collection Systems - Vehicle, Routing, Route Balancing and Transfer Stations

Processing Methods - Recovery and Reuse of Materials and Energy, Disposal Methods such as Sanitary Landfill, Biological Digestion etc., Urban Solid Waste Management and its Modelling.

UNIT-IV

Concept of Environmental Impact Assessment, Analysis, Environmental impact factors and Areas of considerations like Airport, Highways, Power Projects and Irrigation Projects etc.

Measurement of Environmental Impacts, Natural, Physical Impacts, Measurement of social impacts, Economical Impact, Concept of significant impact, Summary of Overview of EIA Process/Methodology.

UNIT-V

Socio-economic impact analysis, types, physical environment, social environment, aesthetic environment, economic environment. Examples of socio economic impacts, outlines of basic steps in socio- economic impact assessment fiscal impact of analysis, analysis of social impact and impact of economic

Term Work -
----
i) It shall be based on above syllabus with one assignment on each unit.

ii) Visit report on solid waste,water treatment plant

402004 Elective-I

Watershed Management

Lectures : 4 Hrs/Week   Theory   : 100 Marks
Practical : 2 Hrs/Week   Term Work : 25 Marks
                                Oral Exam : 25 Marks

UNIT I

Introduction, Definition, Basic Concepts of watershed, its scope, brief history of the subject. Site selection of watershed. Geographical aspects for watershed management, drainage density, drainage enamouty, Bifurcation ratio and hypsometrical analysis of watershed, Types of watershed, Basic geological factor for watershed development, Hydrological fundamental.

UNIT II

Climatic factors for watershed management, Watershed characters and their details, like slope, run off, rate of erosion, sedimentation load on watershed, geology, Hydrogeology, drainage, palterns etc. watersheds in drought prone area. Importance of watershed in hard rock/ alluvial areas.

UNIT III

Watershed modelling, Basic concept of modelling, Basic requirement of data in any watershed. Estimation of resources, water demand for every needs. Recharge through ad-Hoc norm as well as water task. Fluctuation method. seepage and infiltration factor of surface water bodies. Water balance studies, rainfall analysis, etc. Various methods of estimation & present stage of watershed development by ADRC (1979) techniques. Various method of recharge, draft etc.

UNIT IV

Importance of afforestation activities in watershed management its advantages and disadvantages. Role of afforestation in watershed.

Exploration of subsurface data for watershed development various methods of exploration to sesimic and resistivity survey for watershed development. Applications of remote sensing in watershed management. Effects of conservation techniques in watershed.

UNIT V

Study of Rainwater Harvesting Techniques and its details soil conservation techniques and its details, Importance of nala, contour bunding, percolation tanks, subsurface barriers, check dams etc and its details for watershed management.

Study and importance of all kinds of watershed development techniques. Gross benefit ratio of any one development techniques of any watershed.

Practicals/ Termwork :- Practicals are based on above syllabus, various calculations of recharge of draft of any watershed and assignments.

Oral : Exam is based on term work.

Reference :

1) Groundwater   - By Raghunathan

2) Groundwater Assessment, development   - K.R. Karanth
   and management

3) Watershed modelling   - Bligh

4) Basic fundamentals of watershed   - Anna Hazare

5) Geophysical Prospecting   - Dobrin

6) Groundwater in Hardrock area sites   - Dr. B.B.Dhokarikar
   development   Pune India

402004 Elective-I

Earthquake Resistant Design

Lecturer : 4 Hours/Week
Drawing : 2 Hours/Week

Paper   100 Marks
Duration   3 Hrs
Oral   25 Marks
Term Work 25 Marks

UNIT-I

Theory of elastic waves, types of waves, equation of motion for different types of waves.

Introduction to seismology, Nature and causes of earth -quake, Intensity and Isoseismic of India. Magnitude of earth quakes. Effect of waves on ground motion, measurement of waves and ground motion.

UNIT-II

Study of single degree of freedom system, free and forced vibrations, damped and undamped vibrations. Two degree of freedom system considering above modes of vibrations, method of modal superposition. Introduction to multi-degree freedom system.

UNIT-III

Introduction to spectrum technique, acceleration, velocity and displacement spectrum. Study of past earthquake record. Design of earth quake resistant structures by classical and by IS code methods.

UNIT-IV

Vibrations of bars, plates, response of structures to dynamic loading, use of IS codes of practice for design of structures.

Soil Dynamics, Vibrations, causes and effect of vibrations on soils and rocks, Liquefaction of soils, Resonance and amplitude.

Termwork

Minimum five assignments based on each unit.

Oral

Based on above term work.

402004 Elective-I

Remote Sensing in Civil Engineering

Lectures : 4 Hrs/Week	Theory : 100 Marks
Practical : 2 Hrs/Week	Term Work : 25 Marks
	Oral Exam : 25 Marks

UNIT-I

INTRODUCTION :

Definition, it's scope and its brief history. Types of satellite, their uses. Imageries and aerial photograph uses.

SPACE SYSTEM :

Technique of aerial photograph, definition of aerial photographic flight mission, aerial photography camera,types of film, prints and diapositeres, Techniques of satellite photography and it's units and functions, stages in remote sensing, electromagnetic radiation and spectrum,sensors used in remote sensing operation, principles of an air borne scanner.

UNIT-II

APPLICATION IN GEOLOGY :

Lithological interpretation recognising igneous, sedimentary and metamorphic rocks on aerial photographs and satellite pictures. Structural interpretation, determination of strike, dip and amount of dip, study of joints, fractures, faults, dykes, folds and unconfirmity etc. on aerial photographs or satellite pictures.

Case studies of remote sensing application in geology, geomorphology, groundwater, water resources.

UNIT-III

APPLICATION IN WATER RESOURCE STUDIES :

Surface water delineation, study of floods, snow field studies, dam, reservoirs water studies. Surface keys for subsurface water, delineation of these keys on aerial photographs, steps in water investigations of the area seperating area with subsurface water potential.

INTERPRETATION :

Determination of scale, height, slope, stereoscopic exageration, aerial mosaics, annotation of mosaics, photorecognition elements like tone, textures etc.lineaments and it's type, factors affecting aerial photo interpretation, use of different windows. Introduction to the application of computer in the analysis of satellite imageries.

UNIT-IV

GEOMORPHOLOGY :

Geomorphology and it's scope on photo interpretation drainage analysis, drainage patterns, density, frequency. Hand forms associated with primary, secondary and metamorphic rocks. Land forms developed due to structural features like dip, strike, faults, folds etc., role of remote sensing in detection of temporal changes, changes in land forms and in drainage system.

APPLICATION IN CIVIL ENGINEERING

In the study and selection of site for hydraulic structures, application in locating site for construction material, uses in landslides studies, application in transportion engineering.

UNIT-V

PHOTOGRAMMETRY SURVEY

Various terminology in photogrammetry survey, advantages and disadvantages of aerial photographs and satellite pictures. Study of pockets and mirror stereoscope, parallax bar.

APPLICATION IN LAND USE STUDIES :

Terrain studies and soil mapping with the help of remote sensing techniques, application in meteorological interpretation, agriculture, forest areas and environmental studies.

T E R M   W O R K

The term work shall consist of laboratory work based upon
theory syllabus.

UNIT 1-EXPT 1 : Preliminary study of aerial photograph and
              satellite pictures, overlap study.

UNIT 2-EXPT 2 : Determination of primary, secondary and
              metamorphic formations.

UNIT 3-EXPT 3 : Determination of scale of aerial photographs
              and satellite pictures.

      EXPT 4 : Determination of elevation of different
              points with the help of mirror Stereoscope
              and parallax bar.

UNIT 4-EXPT 5 : Study of drainage density,   drainage
              frequency

      EXPT 6 : Study of fractures, faults,   dyke,
              unconformity and folds.

UNIT 5-EXPT 7 : Soil studies.

Oral :

The oral examination will based upon the above syllabus of
the term work.

REFERENCE BOOKS

1) Photogeology and regional mapping   JAB Allum
2) Photogeology   V.C. Miller (MCBRAW
                                         HILLS)
3) Remote sensing principles and   F.F. Sabnis
   interpretation
4) Principles of geomorphology   W.B. Thornbary
                                         (John Woley & Son's)
5) Deciphering of groundwater from   K.E. Netdov,
   aerial photo   T.A.Popova(Oxford &
                                         IBM)
6) Remote sensing in Civil Engg.   T.J.M. Kennine,
                                         M.C. Methews
7) Reading in remote sensing application T.S. Chouhan,
                                         K.N. Joshi
8) Remote sensing of urban environment B.S. Sokhi,
                                         S.M.Rashid
9) Remote sensing principles and   A.N. Patel,
   application   Surendra Singh
10) American Society of photogrammetry   Washington D.C.,
   sensing(1975)   A Manual of remote
                                         sensing

402804 Elective-I

EARTH STRUCTURES

Lecturer : 4 Hours/Week
Drawing : 2 Hours/Week

Examination Scheme :
Theory: 3 Hrs., 100 Marks
Oral : 3 Hrs., 25 Marks
TW : 25 Marks

UNIT-I

Introduction to Earth Structures, Soil and rock as a foundation as well as a construction material, classification, indentification and suitability of soil for works like open cuts, canals, dams embankments for railways, highways abutments for bridges, pavements, investigation of borrow pits.

UNIT-II

Coefficient of active earth pressure, passive earth pressure and earth pressure at rest, graphical and analytical methods of computation of earth pressures behind retaining walls with different conditions, measurement of earth pressure.

UNIT-III

Stability of finite and infinite slopes, stability number, braced cuts, earth pressure behind braced cuts, shorings, sheet piles and cofferdams.

UNIT-IV

Earth dams, Earth and Earthfill dams, Earth and Rockfill dams, types of earth dams, dam cross sections, foundation trenching, embankment, core design, chimney design, filter blankets design, pheratic lines and flow nets, piezometer installation relief wells.

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2

UNIT-V

Earth structure construction, foundation and embankment, placement of earth fill, compaction, methods equipments, field control of compaction, use of scrapers, motor graders, backhoe and dumptrucks in earth structure projects, safety programs and safety precautions, earth structures in B.C.soils foundations.

Termwork :

Termwork shall be in the from of a report comprising of :

Sheet No.1

Based on analytical and graphical methods of computing earth pressures.

Sheet No.2

Based on : Cross Sections, (labelled and dimensioned) of various earth structures (piers, cofferdams, open cuts, sheet piles, embankments, pavements etc.

UNIT-3

Based on : Cross sections of earth dam type, slope stability and flow net.

UNIT-4

Base On : Stability Analysis of a vertical cut and a braced cut, components design.

UNIT-5

Based on : A visit report on an earth structure project site describing project details, activities on site, project scheduling and management techniques, earth moving machines, equipments choice, criteria, economics and numbers.

Oral

Oral shall be based on above Term Work.

List of books :-
----

1) Soil Mechanics & Foundations (by Dr.B.C.Punmia)
   (Laxmi Publications Pvt.Ltd.,New Delhi)

2) Foundations & Earth Structures Design Manual 3.2
   (Scientific Publishers,Jodhpur)

3) Soil & Foundations (by Cheng Liu/Jack B.Evett)
   (Prentice Hall Inc. Englewood Cliffs New Jersey 02032)

4) Earth Manual United States Dept. of the Interior Bureau
   of Reclamation Oxford & IBH Publishing Co.Pvt.Ltd.,New
   Delhi.

5) Construction Equipment (by James E. Russel
   (Reston publishing Co. Inc. A Prentice Hall Co., Reston
   Virginia)

402004 Elective-I

OPEN CHANNEL AND CONDUIT FLOW

Lectures : 04 hours/week	Theory paper:- 100 marks
Practical : 02 hours/week	Duration :- 3 hours
Term-work : 25 marks.	Oral :- 25 marks

UNIT-I
----

1) Uniform flow in trapezoidal and circular channel, calculation of normal depth and critical depth in trapezoidal and circular channel, the first and second hydraulic exponents, hydraulically-efficient channel section for trapezoidal and circular channel sections.

2) Transitions - Rectangular channel with a hump and with change in width.

UNIT -II
----

1) Gradually varies flow theory and computation for trapezoidal channels,differential equation of G.V.F. - alternate forms, different types of G.V.F.profiles and their characteristics and examples of their occurrence, control section.

   Computation of G.V.F. profiles in trapezoidal channel by standard step method, Direct integration method, Ven Te Chow method.

UNIT-III

1) Rapidly varied flow due to weirs, sluice gates, end depths, hydraulic jump, standing -wave flume, Parshall flume

2) Unsteady flow in open channels- Equation of continuity and equation of motion, surges and waves in open channels - simple cases.

UNIT-IV

1) Pipe flows- Three reservoir problem, pipe network. Practical design methods of rising mains and gravity mains using nomograms/charts, economical diam. of rising main

UNIT-V

1) Unsteady flow in conduits :- Mention of types, equation of motion,establishment of flow, water hammer, celerity of pressure wave though rigid and elastic pipes, sudden and gradual and partial opening and closing of valves, details of pressure cycles

2) Surge tanks:- Necessity, location, function, types, analysis of simple cylindrical surge tank considering frictional effects.

TERM-WORK :- Any six of following assignments should be performed

1) Computation of G.V.F. profile in trapezoidal channel by standard step method or by Ven Te Chow method.

2) Developing and running computer programming for numerical method for obtaining G.V.F.profile.

3) Example on transition in rectangular channel

4) Calibration of Hydraulic Jump or surges in open channel

5) Design of gravity/rising main (Dead end system in case of gravity mains)

6) Calculation of water hammer pressures

7) Design of simple cylindrical surge tank.

Oral Exam : Based on above Term work.

Book recommended :-

1) Flow in open channels :- Dr. K.Subramanya
   Tata McGraw - Hill Publishing Company Ltd.New Delhi.

2) Fluid Mechanics :- V.L. Streeter and E.B. Wylie,
   Tata McGraw - Hill Publishing Company Ltd.New Delhi.

3) Fluid Mechanics :- Dr. A.K.Jain
   Khanna Puolishers, Delhi.

4) Theory and Application of Fluid Mechanics:-Dr. K.Subramanya
   Tata McGraw - Hill Publishing Company Ltd.New Delhi.

5) Water Power Engg. :-M.M. Dandekar and K.N. Sharma.
   Vikas Publising House Pvt. Ltd. Delhi.

6) Open Channel Hydraulics :- Ven Te Chow.
   Tata McGraw - Hill Publishing Company Ltd.New Delhi.

402004 Elective-I

LOW COST CONSTRUCTION AND RURAL DEVELOPMENT TECHNIQUE

Lectures : 04 hours/week	Theory paper : 100 marks	
Practical : 02 hours/week	Duration : 3 hours	
Term-work : 25 marks.	Oral : 25 marks	

UNIT-I

Analysis and Design of prefabricated concrete structural elements and structures.Industrialized manufacture of concrete elements, precast concrete construction, joint in precast construction, creation and assembly techniques.

UNIT-II

Rural water supply and sanitation, Problem sources disinfection, Distribution, hand pump, stand posts.

Maintenance problems, Sashay - economic and cultural considerations Sanitation principles of excreta disposal, water carriage and non water carriage systems.

Health hazards, irrigation using waste water, socio-economic and cultural consideration Health education, Transmission of disease, through air, water, food and contact, preventive measures, insect vector rodent carried disease, control measures.

UNIT-III

Conservation for rural development need for conservation and preservation of architectural and historical heritage of different types of structures, monuments and zones needing conservation and preservation in relation to Indian cities. Legislation and Govt. agencies associated with conservation and preservation, experiences abroad and methodology, preparation of action area plans, implementation, costing and phasing, Integration with amenities and services of the city. Theories of conservation and preservation. standards norms and relationship with development plan case studies and report writing.

UNIT - IV

Planning for Rural Development:- National planning and rural development concept of planning, urban, rural, relationship and theories of rural development push pull factors.

Agro based industries, agricultural development, rural transportation and social services, communication with rural area and amenities legislation and existing methodology for rural planning. Energy needs for rural areas. Environmental and ecological consideration in rural planning. Area district and block level development planning and implementation and voluntary organization, rural settlement pattern, planning principles for village, planning and norms, rural settlement evolution and historic perspective, case studies and report writing

Term work:-

one assignment based on each unit

Oral :- Based on above Term work

402007   DAMS AND HYDRAULIC STRUCTURES

Lectures : 04 hours/week	Theory paper:- 100 marks
Practical : 02 hours/week	Duration :- 3 hours
Term-work : 25 marks.	Oral :- 25 marks

UNIT-I
------

1)   Dams :- Introduction, types of dams, selection of site for dam, choice of a dam, economical height of dam.

2)   Gravity dams :- Introduction, forces acting on dam, elementary and practical profile, modes of failure and stability analysis and design of gravity dam, Low and high dams. Construction and materials of construction, preparation of foundation, grouting, concrete for dams and control of cracking, galleries, Joints and keys. Introduction to arch dams(only elementary)

01) Spillways:- Introduction, spillways capacity, Different types of spillways, their construction and suitability, design principles of ogee spillway and siphon spillway

02) Energy dissipation below spillway, types of hydraulic jump, jump height curves and tail water rating curves, various types of energy dissipators.

03) Gates :- various types of spillway crest gates and their uses.

UNIT-III

01) Earth dams :- Introduction, types, elements of earth dam, basic design considerations,causes of failures, piping and its prevention, control of seepage, drainage in earth dams, design of filters and rocktoe, phreatic line, stability of U/S and D/S slopes under various situations, introduction to rockfill dam.

02) Diversion headworks :- Introduction, selection of site, types of weirs and barrages, layout of diversion headwork and its components and functions, causes of failures of weirs on permeable foundations and remedies, design of sub-surface flow, safety against piping and uplift, Bligh's, Lane's and Khosla's theories.

UNIT - IV

01) Canal irrigation:- Types of canals, canal alignment.

Design of unlined stable channels in alluvium, Kennedy's and Lacey's theory and their merits and demerits.

Preliminary sediment transport theory, critical tractive force, suspended and bed loads, design of unlined channels in alluvial soil according to IS 7112 - 1973 Lacey's Method and tractive force approach.

Design procedure for L- section for an irrigation canal, balancing depth, losses in canals, schedule of area statistics and channel dimensions, Garret's and Lacey's diagrams, cross section of irrigation canals.

Lining of irrigation canals, advantages of lining, economics of lining,types of lining. Design of lined channel, land drainage, discharge and spacing of closed drain, various types of canal outlets.

UNIT - V
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01) Canal Masonry works :- Cross drainage works, necessity, types,selection, comparative merits and demerits, various types of falls, their necessity and location, distributary head regulator and cross regulator, escape canal (no mathematical treatment for any of above structures)

02 River Training works:- necessity and types of river training works and bank protection and their construction details. (No mathematical treatment)

03 Hydropower :- General features of hydropower development, advantages of hydropower, type of hydropower plants and their layouts, assessments of power potential.

Term-Work

Following seven assignment should be performed :-

01) Stability analysis of a Gravity Dam

02) Stability analysis of slope of Earth Dam

03) Design of ogee spillway with energy dissipator

04) Analysis of weir on permeable foundation by using Khosla's charts

05) Design of unlined canal in alluvium by using Garret's/Lacey's diagrams (at least three sections along the alignment.) and ploting L-section, also preparing schedule of area statistics and channel dimensions

06) Any one of the following
   01) Analysis and layout and section of any one type of cross drainage work or fall or regulator
   02) Any one type of river training work
   03) A typical layout of high head hydropower plant and functions of the components.

07) Report based on visit to any dam and hydropower plant during the 2nd term.

Oral Exam :- Based on the above T.W.

Imp.note :- Following charts should be provided to students of B.E.(civil) during theory paper.

    i) Dr. A.N. Khosla's curres for design of weir on permeable foundations

    ii) Garret's and Lacey's diagrams for design of canals

    Books recommended :-

1) Irrigation water resources and water power engg.
    Dr. P.N. Modi, Standard Book House, Delhi.

2) Irrigation Engg. and Hydraulic Structures - S.K. Garg

3) Irrigation Engg. and Water Power Engg. - Dr. B.C.Punmia.

4) Theory and design of Irrigation structures, Volume I and II
    Varshney Gupta, Gupta

5) Irrigation Engg. - Bharat singh

6) Irrigation Engg. - K.B.Khushlani

7) Irrigation Engg. and Practice - Justin,Hinds.

402008 ANALYSIS AND DESIGN OF SPECIAL STRUCTURES

LECTURES: 4 HOURS/WEEK   PAPER:- 100 MARKS

PRACTICAL/DRAWING: 4 HOURS/WEEK   ORAL :- 25 MARKS

     TERM WORK :-25 MARKS

UNIT - I

1) Introduction : Basic concept, materials, prestressing systems, stages of loading, stresses in tendons.

2) Losses in prestresses:- Nature of losses, loss due to elastic shortening of concrete, successive prestressing of straight cables, relaxation of stress in steel friction in a curved cable, anchorage.

3) Design of one way and two way prestressed concrete slabs.

UNIT - II

1) Transfer of prestress in pretensioned members, transmission length, end zone reinforcements. Anchorage zone stresses in post-tensioned members-Gayar's method.

2) Limit state design of prestressed concrete members philosophy of design, various criteria for limit states, design loads, strength and serviceability.

3) Design of pretensioned and post tensioned flexural members- Rectangular and flanged sections, cable profile, Design of shear reinforcement, bond partial prestressing working stress and limit state methods.

UNIT- III
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1) Design of gantry girders.

2) Design of steel stacks.

3) Design of an overhead pressed steel tank inducing staging.

UNIT- IV
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1) Design of form -works

2) Analysis of multistorey frames substitute frame method; Analysis for lateral loads. Portal and cantilever methods, Design of multistorey building (8+3) for wind and earthquake loads.

3) Design of flat slabs and sloping slabs.

Term work :- Shall based on above syllabus and it will consist of

i) At least three numbers of imperial size sheets based on prestressed concrete, R.C.C. and steel projects.

ii) Brief report on three site visit on steel, R.C.C. and prestress concrete structures.

iii) Computer applications :- use of computer programs.

   Oral : Based on above Term-work

402009 CONSTRUCTION MANAGEMENT

Lectures : 04 hours/week   Theory paper:- 100 marks

Tutorial : 02 hours/week   Duration   :- 3 hours

Term-work : 25 marks.

UNIT-I

Construction industry, construction team, construction activities, classification of construction, stages in construction, need of management in construction, Ownership and enterpreneurship, small scale industries in construction.

Important acts and Laws related to Construction industry - factory act, P.F. act, minimum wage act, workmen compensation act,industrial dispute act, Indian trade union act, arbitration act, employees state insurance act, land ceiling act, urban land ceiling act, sales of goods act, transfer of property act.

Job layout, mass housing and value engineering.

Scientific management, Management technique and uses, Definition and objectives of management, levels of management, Leadership and its quality.

Organization meaning and function, forms of organisaton -- line, line and self,functional it Type A, Type B and Type C, PWD organization and its types, organization of a contracting firm.

UNIT- II

Network technique :- History, Advantages, Bar charts, S-Curve etc.Various terms used in network technique,activity event, critical path, duration etc. Development of networks, network scheduling, to find various times and float. EST, EFT, TF etc. Monitoring of Network. Three phases of network technique.

PERT and its concept and PERT Time.

UNIT- III

Cost analysis, Cost curve, optimization and crashing of networks. Updating of network during monitoring, resource levelling, allocation, levelling and smoothening.

Line of balance - concept and uses.

UNIT- IV

Materials management, its aims and functions, inventory analysis, inventory models, ABC analysis, inventory management, buffer stock, lead time, EOQ.

Material requirement, planning, market research, system of purchase of materials, stock of material at site, MAS account, working capital management.

Supervision and quality control, concept of quality, stages of control, measures of control, organization for control, quality control management, sample and sampling technique, stabilized quality, control, inspection, introduction to ISO 9000 and ISO 14000.

UNIT - V

Economics its definition and importance, demand and supply, factors affecting demand and supply.

Production its meaning, different factors of production, economics of production, cost concept, relationship of cost to level of production.

Bank, its type, uses and functions, banking systems, book keeping and accounts, balance sheet, ledger book, cash book, purchase book, profit and loss account, appreciation and depreciation of money, functions of money.

Theory of exchange

Term work- It shall consist of assignment based on one on each unit of above syllabus.

UNIT-IV

Water conveyance, speed and pressure, regulation penstocks, its classification, design criteria of penstock, economical diameter, anchor blocks, various types of valves.

Water hammer phenomenon, surge tanks, design procedure of simple cylindrical surge tanks, types of surge tanks, canal surges neglecting friction.

UNIT-V

Wind Power, Introduction, planning, location, space requirement, potential of wind power, merits and demerits, details of construction etc.

Benefit cost ratio and report preparation of hydropower.

Term-Work : Following six assignments should be performed.
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1 to 5) Minimum one assignment should consist of design/ numerial problem and not on the description of theory.

6) Report based on a visit to any hydropower station and wind power station.

Oral Exam : Based on the T.W.

Books recommanded :
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1) Water Power Engg. : M.M. Dandekar and K.N. Sharma
                       Vikas Publishing house, Pvt. Ltd.,
                       Delhi
2) Water Power Engg. : H.K. Barrows, S.B.
                       Tata Mc-Graw Hill Publishing Co.
                       New Delhi
3) Fluid Mechanics : V.L. Streets, E.B. Wylie
                     Mc-Graw Hill books Co.
4) Theory & Application and Fluid Mechanics :
   Dr. K. Subramanya, Tata Mc-Graw Hill.

402010 ELECTIVE-II

INDUSTRIALWATER POLLUTION & CONTROL

Lecturer : 4 Hours/Week   Max.Marks(Theory): 100

Practicals : 2 Hours/Week   Term Work : 25 Marks

                                           Oral : 25 Marks

UNIT(I)

Sources, Nature & Characteristics of Industrial Waste Water,
Industrial Waste Survey, Effects of Wastes on Streams and
Waste Water Treatment Plants and Sewage Tretment Plant,
Difference between municipal & industrial Wastes.

UNIT(II)

Basic knowledge and practice, Quantity and Quality of
Industrial Wastes and their impact on the Environment,
Introduction of PHELIP'S MODEL and its application and
problems on it, estimating organic load content on streams
and problems to find THOD, TOC, COD & BOD.

Waste volume reduction, waste strength reduction,
neutralization, mixing wastes, treatment of acids and
alkaline wastes.

UNIT (III)

Equalization and Proportioning, Removal of Colloidal
Solids, Characteristics, Chemical Coagulation by
Neutralization of Electrical Charges, Mechanism of
Coagulation, Zeta Potential Removal of Organic and
Inogranic, Dissoloved Solids, Evaporation, Dialysis, Ion
Exchange, Reverse Osmosis.

UNIT (IV)

Waste Water Treatment Methodologies for Specific Industries Dairy, Sugar, Joint Treatment of Industrial and Domestic Waste Water, Textile, Paper Industries.

Mathematical Models for Surface Water Quality Systems, Stream & Estuarine Models for Pollution Control.

UNIT (V)

DEFLUORIDATION : Causes of fluorides in water, Significance of Low and High Fluoride Content, De-fluoridation.

Air Stripping of Ammoina and ion exchange methods for removal of ammonia.

Introduction to Remote Sensing and GIS Applications in Environmental Engineering
Adsorption Theory and Isotherms Equipments.

TERMWORK :

Termwork shall consist of practicals, visit report design of units and/or review of papers on above mentioned topics. Minimum six assignments/report/designs shall be done on eachunit.

Oral : Based on above termwork.

402010 Elective-II

Land Development and Drainage Engineering

Lectures 4 hours/week
Practical 2 hours/week
Term Work 25 Marks

Paper 100 Marks
Duration 3 hours
Oral 25 Marks

UNIT-I

Land forming for irrigation necessity and objectives, land shaping, grading levelling criteria for land forming, survey and planning. Land grading, levelling design method, the plane or centroid methods, profile method. Plane inspection method contour adjustment method. Earthwork balance

UNIT-II

Construction procedures-- equipments, machinery, grading levelling procedures.

UNIT-III

Needs of drainage effect of poor drainage on soil and plants. Causes of water logging.
Soil drainage properties-- Drainage porosity Hydraulic conductivity, drainage coefficient, flow of water through porous media .

UNIT IV

Identification drainage problem: Depth to water table contours. HIB damage demarcation rain fall & runoff.

UNIT V

Preventive and creative measures for drainage.

a) Surface drainage - Principles, layout design &
   construction

b) Subsurface drainage - steady state and unsteady state
   modes for drainage design.

Open subsurface drains/closed subsurface drains, their

design, construction and maintenance.

Termwork : One assignment on each unit.

Oral : Based on above termwork.

Reference Books
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1) Drainage Engg. : by Lottin J.N.

2) On farm Development works including micro distribution
   network & land shaping for irrigation : Walmi, Aurangabad
   (MS) Publication No.12

3) Land drainge & reclamation-- Agers Q.C.& Scoats D, Mc
   Graw Hill Book Co.1939.

4) Drainge of irrigated land-- Houston C.E.

5) Farm drainge -- John L.A.

6) Drainge Engg. -- Lathin J.N. Publication Robart E.
   Kveijer Pub.Co. Huntington New York.