Indira Gandhi University, Meerpur, Rewari

Scheme of Studies and Examination

B.TECH. (CIVIL ENGINEERING)

Semester 7th and 8th

Scheme effective from 2020-21
# Scheme of Studies & Examinations

**Indira Gandhi University, Meerpur, Rewari**

**S.C.H.E.M.E. OF STUDIES & EXAMINATIONS**

**B.Tech. 4th YEAR CIVIL ENGINEERING, SEMESTER-VII**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Teaching schedule</th>
<th>Marks for class work</th>
<th>Marks for Examination</th>
<th>Total Marks</th>
<th>Duration of Exam</th>
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<td>CE-401</td>
<td>Design of Steel Structure-II</td>
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<td>Estimating and Costing</td>
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<td>CE-407</td>
<td>Irrigation Engg-II</td>
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<td>Hydro Power Engg.</td>
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<td>Ground Water Engg.</td>
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<td>Irrigation Drawing Lab</td>
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<td>CE-457</td>
<td>Practical Training - II</td>
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<td>General Fitness for the Profession</td>
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<td>-</td>
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**Total** 21 | 7 | 4 | 32 | 400 | 700 | 100 | 1200

**Note:**

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
2. Student will be permitted to opt for any one elective run by the department. However, the departments will offer only those electives for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.
3. Assessment of Practical Training-II, carried out at the end of VI semester, will be based on seminar, viva-voce and project report of the student. According to performance letter grades A, B, C, F are to be awarded. A student who is awarded ‘F’ grade is required to repeat Practical Training.

**Electives**

1) CE-409 - Energy planning and management
2) CE-411 - Environmental pollution and control
3) CE-417 - Finite Element Methods
4) CE-421 - Environmental impact and management
5) CE-423 - Elements of Earth Quake Engg.
6) CE-433 - Hydraulic System Modeling
CE-401 DESIGN OF STEEL STRUCTURES-II

LTP Sessional: 50 Marks
31 Theory: 100 Marks
Total: 150 Marks

SECTION A
Duration of exam: 3 Hrs.

Unit-I: Elementary Plastic Analysis and Design: Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

SECTION B

Unit-II: Industrial Buildings: Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Unit-III: Design of Water Tanks: Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.

SECTION C

Unit-IV: Design of Steel Stacks: Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

Unit-V: Towers: Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

SECTION D

Unit-VI: Cold Formed Sections: Introduction and brief description of various type of cold-formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

Books Recommended:

CE-405 Estimating and Costing

LTP Sessional: 50 Marks

31- Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

SECTION A Estimate:

Principle of estimation, units, item work, different kinds of estimates, different methods of estimation, estimation of materials in single room building, two room building, multi storey buildings, with different sections of walls, foundation, floors and roofs, R.B and R.C.C works, Plastering, white washing, Distempering and painting, doors and windows, lump sum items, Estimates of canals, dams, barrages, Hilly roads etc.

SECTION B Specification of Works:

Necessity of specification, types of specification, general specification, specification of bricks, cement, sand, water, lime, reinforcement: detailed specification for earthwork, cement, concrete, brickwork, flooring, D.P.C, R.C.C, cement plastering, white and colour washing, distempering, painting

SECTION C Rate analysis

Purpose, importance and requirements of rate analysis, units of measurement, preparation of rate analysis, procedure of rate analysis for items: Earth work, concrete works, R.C.C works, reinforce brick work, plastering, painting, finishing (white washing, distempering)

SECTION D Public Works Account


Books

1. Dutta BN – Estimating & costing
2. Chakraborty – Estimate costing & specification in civil engg
CE-407  IRRIGATION ENGINEERING-II- (DESIGN & DRAWING)  

LTP                Sessional:50Marks
3-1-0              Exam : 100Marks
                   Total : 150Marks
                   Durationofexam:3Hrs.

Complete design and drawing of the following:

SECTION A

1 Design of weirs and barrages on permeable foundation for surface and sub surface flow conditions.
2 Design of Guide Banks.

SECTION B

3 Flood Routing using step by step method.
4 Design of SyphonAqueduct.

SECTION C

5 Design of Sarda type fall & sloping glacisfall.
6 Seepage line in a homogeneous earth dams on impermeable foundation with horizontaldrainage.

SECTION D

7 Design of Ogee Spillway and stillingbasin.
8 Design of dams ,aqueducts,symphonic systems & their inlets&outlets ,design of spillways.

Note: Emphasis would be given to the computer aided designs of some of above structures.

BOOKS

1. PunmicBC &PANDE-Irrigation &Water POWEREngineering
2. Sharma .RK –text book of Irrigation Engg &Hydraulicsstructure
3. Sharma RK-Principles &practices of IrrigationEngg
5. Varshney RS &Gupta –theory &design for IrrigationStructures
CE-423 ELEMENTS OF EARTHQUAKE ENGINEERING

LTP
31 -

Sessional: 50Marks
Theory : 100Marks
Total : 150Marks
Duration of exam: 3Hrs.

SECTION A
Unit-I: Seismology
Introduction, plate tectonics, earthquake distribution and mechanism, seismicity, seismic waves, earthquake magnitude and intensity, seismic zoning and seismometry.

Unit-II: Single Degree of Freedom Systems
Various types of dynamic loads, vibration of single degree of freedom system, Free and forced vibrations, types of damping, critical damping. Transmissibility, vibration measuring instruments, response spectrum.

SECTION B
Unit-III: Multi-degrees of Freedom (MDOF) Systems

SECTION C
Unit-IV: Seismic Analysis and Design
General principles, assumptions, seismic coefficient method, response spectrum method, strength and deflection, design criterion for structures, significance of ductility, design and detailing for ductility, codal provisions, design examples.

SECTION D
Unit-V: Seismic Performance, Repair and Strengthening

Unit-VI: Vibrational Control
General features of structural control, base isolation, active and passive control system. Earthquake resistance design as per I.S: 1893, I.S: 4326 and I.S:13920.

Books Recommended:
2. Dynamics of Structures, Clough & Penzion, McGrawHill
4. Earthquake Resistant Concrete Structures, George G.Penelis and A.J.Kapoor, E & FN Sons,Madras
CE-409 - ENERGY PLANNING AND MANAGEMENT

LTP Sessional: 50Marks
31 - Theory : 100Marks
Total : 150 Marks
Duration of exam: 3Hrs.

SECTION A Unit-I: Planning

Energy scenario of the world in general and India in particular with respect to demand, supply and resources, energy requirement and demand forecasting, isolated and integrated planning, concept of national grid, rural energy planning.

Unit-II: Generation

Production of energy from conventional and non conventional sources - Hydel, Thermal, Nuclear, Solar, Tidal, wind, M.H.D., Geothermal, Bioconversion etc. Economic feasibility and cost analysis.

SECTION B Unit-III: Ecological & Environmental aspects

Impact assessment of power plants on environment and ecosystem, Environmental degradation & control strategies, Air population, water population and their control.

SECTION C Unit-IV: Engineering Aspect

Load predictions, peak load, base load, load factor, plant factor, capacity factor etc. operation and economics of power stations. Losses in energy generation, transmission and distribution, energy storage and conservation techniques, reliability analysis energy system, energy audit and economics.

SECTION D Unit-V: Instrumentation

Measurement of pressure, flow temperature and humidity, concept of automatic control, power & frequency control, voltage & reactive power control. Microprocessor applications in power systems.

Books Recommended:

1. Energy Planning & Management by D. Sawyer.
CE-421 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

LTP Sessional: 50 Marks
31 -

Total: 150 Marks

Duration of exam: 3 Hrs.

SECTION A

Unit I: Environmental Problems and Issues: Explosion of Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review of national and international developments related to environmental issues.

Unit II: Review of Remedial Actions: Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology. Religio- philosophical approaches and concept of Deep ecology. Market based instruments including taxation for pollution control; Role of environmental ethics.

SECTION B


SECTION C

Unit IV: Sustainable development: Concept of limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services etc. Their interlinkages and use of Systems approach including feedback loops. Carrying capacity of systems, prerequisites for sustainable development, concepts of sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure.

SECTION D

Unit V: Impact Assessment: Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for the above.

Books Recommended:

1. Ecology and Environment by P.D. Sharma
2. Environment Management in India by R.K. Sapru.
3. Environmental Quality Management by Bindu N. Lohani
SECTIONA  
Unit-I: General Procedure of Finite Element Methods.

Basic concept of FEM engineering applications. Comparison of FEM with other methods of analysis. Discretization of
the domain basic element shapes. Descritization process. Interpolation polynomials. Selection of the order of the
interpolation polynomial. Convergence experiments. Linear interpolation polynomial in terms of global and local
coordinates. Formulation of elements characteristics matrices and vector’s direct approach. Variation approach.
Weighted residual approach. Assembly of elements matrices and vectors and derivation of system equation together
with their solution.

SECTIONB  
Unit-II: High Order and Iso-Parametric Element Formulations

Introduction. Higher order one-dimensional element. Higher order elements in terms of natural coordinates and in terms
of classical interpolation polynomials. Continuity condition, Numerical integration in one, two and three dimensions.

SECTIONC  
Unit-III: Solid And Structural Mechanics

Introduction. Basic equation of solid mechanics. Static analysis – formulation of equilibrium equations. Analysis of
trusses and frames, analysis of plates, analysis of three dimension problems. Analysis of solids of revolution. Dynamic
analysis, dynamic equation of motion. Consistent and lumped mass matrices. Constant mass matrices in global
coordinate systems. Dynamic response calculation using FEM.

SECTIOND  
Unit-IV: Applications and Generalisation of the Finite Element Method

Energy balance and rate equations of heat transfer. Governing differential equation for the heat conduction in three
dimensional bodies. Derivation of finite element equation for one dimensional, two dimensional. Unsteady state and
radiation heat transfer problems and their solution. Solution of Helmotz’s equation and Reynolds equation. Least
squares finite element approach.

Books Recommended:

2. Numerical methods in Finite Element Analysis, Klaus-Jurgen Bathe & Edward L Wilson, PHI

Note: In the semester examination, the examiner will set eight questions in all entire syllabus and students will required
to attempt only 5 questions.

The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular
phone will not be allowed.
CE-411 Environmental pollution and control

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Max.Marks: 150 marks

Theory: 100 Marks
Sessional: 50-Marks
Duration: 3 Hours

SECTION-A
Principles involved in the protection of public health sanitation of dwelling houses, principles of villages and town planning: land pollution and its control. Economics of environments, evaluations, natural resources.

SECTION-B
Air borne diseases and their control, sources of pollution, occupational health

Environmental management techniques, sensitive analysis, risk assessment.

Water borne diseases, river pollution and control of water pollution

SECTION-C
Environmental Consideration of ventilation, air conditioning and illumination

Environmental Auditing-general methods, audit process,

SECTION-D
Sample collection and sampling devices: mathematical modeling Application of above in the design of hospitals and other public buildings

Environmental management system standards-

Books:

Environmental management- Vijay Kulkarni-et al.Capital publishing company, N Delhi

Bhatia H.S. Environmental pollution & Control- Galgotia
CE 455  Irrigation Drawing (lab)

LTP                                      SESSIONAL-50
O-o-2                                    TIME DURATION-3hrs

I Drawing of Aqueducts

2 Earthen Dams and Concrete Dams drawings

3 Drawings of Spillways

4 Outlet, inlets drawings

5 Culverts

6 Head Regulators

7 Drawings of Barrages and Weirs

8 Drawing of fall
CE-433 HYDRAULICS SYSTEM MODELLING

LTP 3 1 -
Sessional: 50Marks
Theory : 100Marks
Total : 150 Marks
Duration of exam: 3Hrs.

SECTION A

Unit I: Development of water resources, demand of water, availability of water, estimation of surface water flow at ungaged site.

Drainage System: Types of drainage systems, Urban drainage system, Agriculture drainage system, Roadways drainage system, Airport drainage system, computer applications.

SECTION B

Unit II: Computation of extreme flow: Concept of probability in hydrology, design flood for hydraulic structure, methods of flood frequency analysis, computation of peak flow from precipitation, measurement of peak discharge.

SECTION C

Unit III: Conveyance System: Methods of conveyance of water, resistance equations for flow, design of rigid boundary channels, design of loose boundary channels. Conduit System: Types of pipes, laying of pipes and joints, forces and stresses in pipe band, pipe line analysis and design, methods of supplying water, storage and distribution reservoir, pipe materials, large conduit design. Hydraulic transient analysis.

SECTION D


Books Recommended:

2. Hydrology & Hydraulic System – Ram S.Gupta, Printice Hall, NewDelhi
SECTION A


SECTION B

Unit II: Effect of boundaries, interference of water, leaky aquifers, Thiem’s equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers. Partial penetration of an aquifer by a well, spherical flow in a well. Non equilibrium formula for aquifer (unsteady radial flows).

SECTION C

Unit III: Tube wells, optimum capacity, silting of tube well, design of tube wells in different aquifers, tube well types, parts, bore hole, strains, its types, well pipe, casing pipe, blind pipe. Construction and working of tube wells, site selection, drilling operation, cable tool method, hydraulic method, rivers Rotary Method and drilling fluids, well screen assembly installation, verticality and alignment of tube wells, gravel packing, development of tube wells, sickness, in construction and corrosion and failure of tube wells, Pumping equipment and hydraulic testing of pumps.

SECTION D

Unit IV: Artificial recharge of ground water, considerations and methods, recharge techniques induced infiltration, water spreading, flooding, basins, ditching, modification of natural channels, irrigation, recharge pits, shafts and recharge wells.

Books Recommended:


2. Groundwater, H.M.Raghunath, Wiley Eastern Ltd., N.Delhi
CE 403  DISASTER MITIGATION AND MANAGEMENT

L T P  
3 1-  
Sessional: 50 Marks
Theory : 100Marks
Total : 150Marks

SECTION A

- Introduction to disaster Control –integrated approach ,role of engineer
- Hydrological, coastal and marinedisaster
- AtmosphericDisaster

SECTION B

- Geological mass movement and landdisasters
- Case studies –Damage profile analysis–uttarkashi/Bhuj/IATUR
- Disastermitigation

SECTION C

- Forest related disasters
- Wind and water drivendisasters
- Miningdisasters
- Major earthquake&causes

SECTION D

- Building codes & other recommended practices cyclones &landslides –causes&remedies
- Hazard resistant construction –symmetry eccentric loading ,framed structure,soft floors ,simple configurations

Books

- IS 4326-1993 code of practice for earth quake resistant construction BIS,IS 13920-1993-
- Ductile detailing of reinforced concrete structure Journal of Indian building Congress Vol IV 1997,Seismic design
- Guidelines for improving earthquake structure Johri etc disaster Mitigation –Experiences &Reflections.
CE-451 HYDROPOWER ENGINEERING

LTP 31 - Sessional: 50Marks

Theory : 100Marks

Total : 150 Marks

Durationofexam:3Hrs.

SECTION-A UNIT-I

INTRODUCTION-Sources of energy, status of hydropower, thermal vs hydropower, advantages of hydropower, place of hydropower in powersystem

UNIT-II

Electrical load on hydropower, load curves, load factor, capacity factors, utility factors, diversity factors, load on hydropower stations, load curves, load duration curves, firm power, secondary power, prediction of loads

SECTION-B UNIT-III

Types of hydropower stations - classification of hydropower stations, run of river plants, general layout of run of river plants, Valley dam plans, storage and pondage. Examples

UNIT-IV

Basic features of hydropower plants - advantages of pump storage plants, storage plants, types of pump storage plants, reversible turbines, efficiency of pump storage plants. Examples.

SECTION-C UNIT-V

Water Conveyance System - Classification of penstocks, design criteria of penstocks, anchor blocks, types of valves, water hammer, surges in power channels, Examples. Types of Surge shafts - surge analysis, design of surge shafts. Examples.

SECTION-D UNIT-VI

TURBINES - Types of turbines, criterion for selection, specific speed of turbines, unit power, unit discharge, cavitation in turbines, design of draft tube. Examples

UNIT-VII

Types of powerhouses - types of powerhouses, layout of powerhouses, ventilations, underground powerhouses, advantages. Examples.

Reference - Water Power Engineering by Dandekar and Sharma

Hydropower Structures Volume III - By RSV arshney

Hydro Power Engineering By Dr. Darde P N, Vayu Education, Delhi
At the end of each year students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the principal/Director of the College. A specimen perform indicating the weight age to each component/activity is given below:-

Name : ___________________________ College Roll No. ___________________________
Univ. Roll No. ______________________ Year of Admission _______________________

I. Academic Performance (15 Marks):
   (a) Performance in University Examination :-

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II. Extra Curricular Activities (10 Marks):
   Item | Level of Participation | Remarks (Position Obtained)

Indoor Games (Specify the Games) __________________________________________

Outdoor Games (Specify the Games) __________________________________________

Essay Competition __________________________________________________________

Scientific Technical Exhibitions ____________________________________________

Debate _________________________________________________________________

Drama _________________________________________________________________

Dance _________________________________________________________________

Music _________________________________________________________________
Fine Arts

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Painting

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Hobby Club

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N.S.S.

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Hostel Mgt

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Activities

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Any other activity (Please Specify)

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III. Educational tours/visits/Membership of Professional Societies (5Marks)
1. ...........................................
2. ...........................................
3. ...........................................
4. ...........................................
5. ...........................................
6. ...........................................

IV. Contribution in NSS Social Welfare Floor Relief/draught relief/Adult Literacy mission/Literacy Mission/Blood Donation/Any other Social Service (5 Marks)
1. ...........................................
2. ...........................................
3. ...........................................
4. ...........................................
5. ...........................................
6. ...........................................

V. Briefly evaluate your academic & other performance & achievements in the Institution (5Marks)

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VI. Performance in Viva voce before the committee (10Marks)

 ...........................................
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*Marks obtained 1.( )+II( )+III( )+IV( )+V( )+VI( )=

**Total Marks :
Indira Gandhi University, Meerpur, Rewari

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. 4th YEAR CIVIL ENGINEERING,
SEMESTER- VIII

<table>
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<tr>
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<tr>
<td>1.</td>
<td>CE- 402 Industrial Training/Institutional Project Work</td>
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Note:
The students are required to undergo Industrial Training in State/Central PWD, Railways and other Originations or Institutional Project Work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the mid-term progress report at the Institute. The presentation will be attended by a committee. Alternately, the teacher may visit the Industry to get the feedback of the students.

The final viva-voce of the Industrial Training or Institutional Project Work will be conducted by an external examiner and one internal examiner appointed by the Institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the Board of Studies in Engg. & Technology. Assessment of Industrial Training or Institutional Project Work will be based on seminar, viva-voce, report and certificate of Industrial Training or Institutional Project Work obtained by the student from the industry or Institute.

The internal marks distributions for the students who have undergone Industrial Training consist of 50 marks from the industry concern and 100 marks by the committee members consisting of faculty members of concerned department of the parent institute.

The teachers engaged for Institutional Project work shall have a workload of 2 hours per group (at least 4 students) per week.