Dr. Bhimrao Ambedkar University, Agra

A State University of Uttar Pradesh (Paliwal Park, Agra -282004)

www.dbrau.ac.in

A Documentary Support

for

Matric No. – 1.1.2

employability/ entrepreneurship/ skill development

under the

Criteria – I

(Curriculum Design and Development)

Key Indicator - 1.1

in

Matric No. – 1.1.2

B.E. CIVIL ENGINEERING

2018

Mapping of course to:

Employability | Entrepreneurship | Skills Development

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CO's OF CIVIL ENGINEERING DEPARTMENT

ENVIRONMENT AND ECOLOGY (MC 301/ MC 401) L T P C- 2 0 0 0

COURSE OUTCOMES:

On completion of this course, students will be able to

CO1: Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

CO2: Critically analyze technical subject matter (written or oral) for scientific merit apply learned environmental knowledge and understanding to solve technical /research problems in new contexts.

CO3: Effectively apply basic principles of the natural and social sciences to current issues of natural resources and the environment.

CO4: Understand and appropriately use the vocabularies of the natural and social sciences relevant to issues of natural resources and the environment.

ENGINEERING FLUID MECHANICS - I (BCE 401)

L T P C 3 1 0 4

Course Outcome:

At the end of the course the student should be able to:

CO1: Understand property of fluid, measurement of pressure and broad principles of fluid statics.

CO2: Inculcate knowledge on description of fluid motion, stream and velocity potential, their properties and applications.

CO3: Understand the dynamics of fluid flow -energy equation and its applications and gain knowledge about dimensional and model analysis

CO4: Analyse the Flow through Pipes, Laminar and turbulent flows, major and minor losses in pipes.

CO5: Understand and solve the boundary layer problems and evaluate friction over surface.

DISASTER MANAGEEMNT HSMC-401

L T P C 2 0 0 2

Course Outcomes (CO):

Upon successful completion of this course, students will be able to:

CO1. The student will develop competencies in the application of Disaster Concepts to Management

CO2. Analyzing Relationship between Development and Disasters.

CO3. Ability to understand Categories of Disasters, their impacts and realization of the responsibilities to society.

CO4. To gain understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction

CO5. To provide basic conceptual understanding of disasters and its relationships with development.

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STRUCTURAL ANALYSIS-I (BCE 402) L T P C 3 1 0 4

Course Outcomes:

Upon successful completion of this course, students will be able to:

CO1 Understand the concept of determinate and indeterminate structure.

CO2 Understand the effect of moving load and can analyze and draw the influence line diagrams.

CO3 Understand and apply different methods and theorems in the analysis of various structures.

CO4 Compute the effect of vertical loads on beams, columns and arches and understand the phenomenon related to it.

CO5 Understand the concept of degree of freedom and slope deflection and can apply the knowledge in analyzing the frames.

ESTIMATING & COSTING BCE-403

L T P C
2 2 0 4

Course Outcome

Upon successful completion of this course, students will be able to:

CO1 Prepare the preliminary estimate for administrative approval & technical sanction for a civil engineering project.

CO2 Understand and write the specification of the works to be undertaken prepare the tender & contract documents and make use of knowledge of different contract submission & opening in awarding the work to the contractor.

CO3 Use & execute the concept of SD, EMD, MAS, Running Bill, Final Bill during the entire project

CO4 Prepare the bar bending schedule & also be able to find the quantity of steel

CO5 Use the technique of Rate analysis in estimating the exact cost of material & manpower and hence the entire project. & finding the rate per unit.

C06 Prepare the estimate the bill of quantities using different techniques of preliminary & detailed estimation of buildings & roads

BCE 404 GEOTECH ENGINEERING L T P C 3 0 0 3

Course Outcomes:

Upon successful completion of this course, students will be able to:

CO1: Understand the origin of the soil and geological cycle, phase diagram for soil properties and perform basic weight-volume calculations.Understand consistency of soil and soil classification.

CO2: Understand the basic science of soil compaction. Understand basics principles of flow and soil permeability through porous media including Bernoulli's equation, Darcy's Law, and Hydraulic conductivity. Understand seepage in soil include Laplace equation of continuity. Construct flow nets for water flow.

CO3: Understand how stresses are transferred through soils and be able to compute boussineq's and westergard equation and induced stresses due to point, line, and area loads. Estimate the amount of consolidation and settlement and time required for settlement under a given load.

CO4: Basic knowledge of shear strength principles including the Mohr-Coulomb failure criterion. understanding of Lateral Earth Pressure concept and theory including Rankine's and coloumb theory of active and passive earth pressures with and without sloping backfill.

CO5: Deep Knowledge of site investigation. Understand the basic concept of ultimate bearing capacity of shallow foundations including modification of bearing capacity equations for water table.

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Human Values and Professional Ethics (MC 401/MC 302)

Course Outcome

On completion of this course, the students will be able to:

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
4. Distinguish between ethical and unethical practices, and start working over the strategy to actualize a harmonious environment wherever they work.

PCC	ENVIRONMENTAL ENGINEERING	BCE 501	3 1 0	4 CREDITS
COURSE OUTCOMES:				
CO1	Analyze characteristics of water and wastewater			
CO2	Estimate the quantity of drinking water and domestic wastewater generated			
CO3	Design components of water supply systems			
CO4	Design sewerage system.			
CO5	Design of waste water filtration plants.			

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LC	ENVIRONMENTAL ENGINEERING Lab	BCE 551	0 0 2	1 CREDIT
COURSE OUTCOMES:				
CO1	Determine physical, chemical and biological characteristics of water and wastewater			
CO2	Determine optimum dosage of coagulant			
CO3	Determine break - point chlorination			
CO4	Assess the quality of water and wastewater			

PCC	ENGINEERING GEOLOGY	BCE 502	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Students are able to identify the different rocks and minerals based on their property			
CO2	Students are able to understand the different method of geological exploration			
CO3	Understand the earthquake causes.			
CO4	Understand the underground water Sources.			
CO5	Students are able to understand the different geological structures and their impact on civil engineering structure.			

LC	ENGINEERING GEOLOGY LAB	BCE 552	0 0 2	1 CREDITS
COURSE OUTCOMES:				
CO1	Identify minerals and rocks			
CO2	Measure strike and dip of the bedding planes			

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PCC	STRUCTURAL ANALYSIS-II	BCE 503	3 1 0	4 CREDITS
COURSE OUTCOMES:				
CO1	Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames.			
CO2	Analyze of Continuous beam & Frame by Moment-Distribution Method.			
CO3	Analyze of Vertical & Horizontal loads by Approximate Method.			
CO4	Identify Plastic analysis of beams & frames.			
CO5	Apply the methods of indeterminate truss analysis.			

LC	STRUCTURAL ANALYSIS-II LAB	BCE 553	0 0 2	1 CREDITS
COURSE OUTCOMES:				
CO1	Verification of reciprocal theorem and moment area theorem			
CO2	Analysis of truss and curved members			
CO3	Analysis of three hinge arches			
CO4	Determine elastic properties of beam and analysis of struts			

MC	OCCUPATIONAL HEALTH AND SAFETY	MC 501	2 0 0	0 CREDIT
COURSE OUTCOMES:				
CO1	Understand the diseases associated with occupation.			
CO2	Manage safety in industries by suggesting safety measures.			
CO3	Identify the accidental causes & apply the preventions.			
CO4	Identify Fire Explosion & apply PPE.			
CO5	Identify & apply Hazards & Risk identification, Assessment and control techniques.			

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HSMC	ECONOMICS FOR INDUSTRY	HSMC 601	2 0 0	2 CREDITS
COURSE OUTCOMES:				
CO1	Define the main concepts and describe the models and methods in economic analysis			
CO2	Explain economic events in individual markets and the aggregate economy using basic theory and tools			
CO3	Apply supply and demand analysis to relevant economic issues			
CO4	Explain how individual decisions and actions as a member of society affect the economy locally, nationally and internationally			
CO5	Distinguish between perfect competition and imperfect competition and explain the welfare loss in non-competitive markets			

PCC	HYDRAULIC AND HYDRAULIC MACHINES	BCE 601	3 1 0	4 CREDITS
COURSE OUTCOMES:				
CO1	Understanding the Computation of drag and lift coefficients			
CO2	Analyzing channels for design			
CO3	Understanding flow profiles in channel transitions and analyze hydraulic transients			
CO4	Evaluating the working proportions of hydraulic machines			
CO5	Analyzing compressible flows of liquids and gases			

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LC	HYDRAULIC & HYDRAULIC MACHINES LAB	BCE 651	0 0 2	1 CREDIT

COURSE OUTCOMES:

CO1	Determine Manning's and Chezy's coefficients for smooth and rough channels
CO2	Understand the velocity distribution in an open channel flow.
CO3	Understand the various characteristics of pump.
CO4	Determine the coefficient of discharge for notches.
CO5	Interpret the lab results keeping in mind the real life scenarios

PCC	TRANSPORTATION ENGINEERING	BCE 602	3 1 0	4 CREDITS

COURSE OUTCOMES:

CO1	Know about the historical development of roads and road development plans of India
CO2	Design the components of Highway geometry according to the IRC.
CO3	Learn about traffic characteristics, traffic studies, traffic control devices including the design of traffic signals and rotary intersections.
CO4	Design the flexible pavement and rigid pavement according to the IRC: 37-2001 and IRC: 58-2011 respectively. Describe the highway materials used for road construction and their tests.
CO5	Describe the highway construction methods generally used in India and the type of failures in pavement. Evaluate and design the overlay using Benkelman beam's method.

LC	TRANSPORTATION ENGINEERING LAB	BCE 652	0 0 2	1 CREDIT

COURSE OUTCOMES:

CO1	derstand the significance of laboratory tests performed on highway materials
CO2	Study about the desired properties of highway materials
CO3	dy and perform various lab tests procedures and safety precautions to be taken care of while performing tests.
CO4	erpret the lab results keeping in mind the real life scenarios

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LC	CAD LAB	BCE 653	0 0 6	3 CREDIT
COURSE OUTCOMES:				
CO1	Identify the available open source software tools used for specific problems in Civil Engineering.			
CO2	Use the latest software tools for Modeling, Analysis and Design of Civil Engineering Systems.			

PCC	CONSTRUCTION PLANNING & MANAGEMENT	BCE 701	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Understand the modern management techniques like as CPM/PERT with network analysis.			
CO2	Identify the equipment used in construction			
CO3	Prepare tender and contract document for a construction project			
CO4	Understand & specify the public work accounts.			
CO5	Prepare schedule of activities in a construction project			

PCC	DESIGN OF CONCRETE STRUCTURE	BCE 702	3 1 0	4 CREDITS
COURSE OUTCOMES:				
CO1	Understand various concrete making materials, apprehend design philosophies used in design and analysis of reinforced concrete structures and use Working Stress Method (WSM) in the design and analysis of RCC beams in bending.			
CO2	Apply Limit State Method (LSM) in the design and analysis of RCC beams in bending.			
CO3	Examine the behavior of RCC beams in shear and torsion and their design using LSM.			
CO4	Identify one-way and two-way slab and Use LSM in Design of one-way and two-way slab in shear, bending and torsion.			
CO5	Understand various assumptions used in design of columns, evaluate effective length and slenderness ratio of column and analyze and design a short column under axial load, and uni-axial and bi-axial bending.			

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PCC	DESIGN OF STEEL STRUCTURE	BCE 801	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Understand the advantages and disadvantages of steel as a structural material.			
CO2	Create simple bolted and welded connections.			
CO3	Analyze and design Tension members, Compression members, Flexural members.			
CO4	Analyze & Design of Beams & Columns.			
CO5	Analyze & Design of Girder.			

PEC	ENGINEERING HYDROLOGY & FLOODS	DE-CE 505	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Analyse hydro-meteorological data.			
CO2	Develop rainfall-runoff models.			
CO3	Compute yield from surface and subsurface basin.			
CO4	Introduction & Occurrence of ground water			
CO5	Formulate and solve hydrologic flood routing models.			

PEC	PLANNING AND MANAGEMENT OF BUILDINGS	DE-CE 601	3 1 0	4 CREDITS
COURSE OUTCOMES:				
CO1	Identify the components of urban forms.			
CO2	Understand the function planning of buildings.			
CO3	Design of public buildings.			
CO4	Understand the fire resistance.			
CO5	Apply the engineering services in buildings.			

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PEC	BRIDGE ENGINEERING	DE-CE 704	3 0 0	3 CREDITS

COURSE OUTCOMES:

CO1	Remember the different design philosophies of the highway and railway bridges.
CO2	Understand the structural behavior of different components of a RCC and steel bridge.
CO3	Apply the techniques, skills, and modern engineering tools in steel bridges.
CO4	Understand about the suspension & cantilever bridges.
CO5	Analyze the design forces, bearings of the joints. Apply the maintenance.

PEC	GROUNDWATER MANAGEMENT	DE-CE 803	3 1 0	4 CREDITS

COURSE OUTCOMES:

CO1	Understand the hydrologic cycle and about the porous media which is responsible for ground water improvement.
CO2	Learn the methods to extract the water from ground
CO3	Develop and design of well and monitor recharge capacity as well as efficiency of well.
CO4	Understand the quality& exploration of ground water.
CO5	Understand the Ground water management techniques.

PEC	EARTHQUAKE RESISTANT DESIGN SYSTEMS	DE-CE 810	3 1 0	4 CREDITS

COURSE OUTCOMES:

CO1	Understand the basic concepts on theory of Engineering Seismology.
CO2	Analyze of Single & Multi degree of freedom.
CO3	To Acquire knowledge in knowing the performance of buildings under past earthquakes.
CO4	Understand the underground water Sources.
CO5	To get knowledge on earthquakes and its resistant features for different types of buildings.

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OEC	URBAN & TOWN PLANNING	OE-CE 502	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Understanding the urban areas.			
CO2	Apply the Urban planning.			
CO3	Apply the town & country planning.			
CO4	Understand the traffic transportation systems.			
CO5	Understanding the Development plans.			

OEC	ENVIRONMENTAL MANAGEMENT	OE-CE 602	3 0 0	3 CREDITS
COURSE OUTCOMES:				
CO1	Identify the various environmental issues.			
CO2	Apply Environmental impact assessment.			
CO3	Apply the Environmental policies & technology for environment management.			
CO4	Identify the Contemporary issues.			
CO5	Apply the Environmental legislation.			

Non-Conventional Energy Resources (OE-ME 701)

Prerequisite: Basic Knowledge of Power Plant Engineering.

Couse Outcomes (COs):

1. Illustrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells.
2. Study the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.
3. Study the working principle of geothermal energy,Magneto-hydrodynamics (MHD) and fuel cell technology for energy generation.
4. Explore the concepts involved in wind energy conversion system by studying its components, types and performance.
5. Study the working principle of bio mass, wave and tidal wave and OTEC.

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OEC	INFRASTRUCTURE ENGINEERING	OE-CE-802	3 1 0	4 CREDITS

COURSE OUTCOMES:

CO1	Identify the elements of Building.
CO2	Identify waste water & water supply sources.
CO3	Understand about transportation infrastructure (Road, rail and air).
CO4	Analysis the various characteristics of Dam, Canal, Port, Hourber and Hydroelectric projects.
CO5	Introduction to architecture, land use planning.

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Department of Civil Engineering, Institute of Engineering & Technology, Agra

VISION & MISSION OF CIVIL ENGINEERING DEPARTMENT FOR NEXT DECADE

Vision of the Institution: To be a leading Institute offering quality technical education, research and preparing technocrats with applicable knowledge for meeting or fulfilling the needs of the industry and society.

The vision of a department is to prepare students to become highly skilled and innovative civil engineers who can meet the needs of society and make a positive impact on the world.

Education: The civil engineering department aims to provide a high-quality education that prepares students for successful careers in civil engineering. This may include a focus on developing technical skills, as well as soft skills like communication, teamwork, and problem-solving.

Research: The department aims to conduct cutting-edge research that enhances the field of civil engineering and addresses important societal challenges. This research may include topics like sustainability, resilience, and infrastructure design.

Community engagement: The civil engineering department aims to prioritize community engagement, seeking to work with local communities to understand their needs and develop infrastructure that serves them effectively.

Global perspective: Civil engineering is a global field, and the department aims to provide students with a global perspective on engineering challenges and solutions. This may include study abroad opportunities, collaborations with international partners, and a focus on addressing global challenges like climate change.

Overall, the vision of a civil engineering department is to provide students with the education, skills, and perspective they need to become successful and impactful civil engineers who can meet the needs of society and make a positive contribution to the world.

Mission of the Institution:

M1: To introduce quality programmes with an updated curriculum in the thrust area of the technology.

M2: To provide the state-of-the-art infrastructure and employ competent and committed human resource for carrying out teaching and research.

M3: To create and nurture a conducive environment for teaching-learning using modern tools, research and critical thinking.

M4: To produce technocrats and entrepreneurs who are responsible and are adaptable towards the changing needs of industry.

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Program outcomes suggested by the NBA for engineering programs

Program Outcomes (POs), are attributes acquired by the student at the time of graduation. The POs given in the Table below, ensure that the POs are aligned to the Graduate Attributes (GAs) specified by National Board of Accreditation (NBA). These attributes are measured at the time of Graduation, and hence computed every year for the outgoing Batch. The POs are addressed and attained through the Course Outcomes (COs) of various courses of the curriculum.

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PO11. Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Department of Civil Engineering

Vision of the Department:

To become a centre of excellence in the field of Civil Engineering by providing quality education and research to produce human resource to cater the needs of Industry and Society.

Mission of the Department:

M1: To provide the state-of-the-art infrastructure and employ competent & committed human resource for carrying out teaching and research.
M2: Developing strong foundations in core areas of Civil & Environment Engineering by subsuming theory with extensive practical training and exposure to construction industry.
M3: Developing skilled professionals for Industry and R&D organizations.
M4: Developing value based socially committed professionalism for the holistic development

Program Educational Objectives:

The broad objective of the program is to facilitate the development of competent and successful professionals in tune with modern day technological and societal requirements. The department of Civil Engineering at IET Khandari, has developed and maintain a well-defined set of educational objectives. The objectives undergo continuous review and modification to assure the quality of our program and graduates. The most recent version of our educational objective list is given below.

PEO 1: Attain the analytical expertise to create, analyse, formulate, and solve challenging problems in the field of Civil Engineering; and recognize and develop the necessary and suitable tools for the same.

PEO 2: Develop technical and management flair to take responsibility for engineering projects and research programs significantly.

PEO 3: Uncover multidisciplinary approach and co-relate engineering issues to social and human background in broader sense, in which their engineering helping hand will be utilised.

Program Specific Outcomes

PSO1: Plan, analyse, and design infrastructural projects and its components in various areas of Civil Engineering like Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Environmental Engineering, and Transportation Engineering.

PSO2: Execute the construction of buildings and other components of various projects in Civil Engineering including its layout, management, and quality control.

PS03: Implement the provisions made in Indian Standard Codes/ other relevant codes/ specifications/ guidelines and applicable laws including labour laws and environmental laws.

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PEO-PO MAPPING

POs / PEOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
PEO 1	3	2	3	3	3	2	1	1	3	2	3	1
PEO 2	3	3	3	3	3	3	2	2	2	3	3	2
PEO 3	1	1	3	1	1	3	3	3	3	1	2	3

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Employability Entrepreneurship Skill Development