Jabalpur Engineering College, Jabalpur

Semester VI Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Civil Engineering)

Subject wise distribution of marks and corresponding credits

Scheme of Examination w.e.f. July-2017 (Academic Session-2017-18)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Hours / week.			Total Credits	Total Marks
			Theory			Practical		Total Marks					
			End Sem	Mid Sem. MST	Quiz, Assign ment	End Sem.	Lab Work		L	T	P		
1	**CE6001**	Water Resource Engineering -I	70	20	10	-	-	100	3	1	-	4	
2	**CE6002**	Structural Analysis-II	70	20	10	30	20	150	3	1	2	6	
3	**CE6003**	Structural Design & Drawing-II (Steel)	70	20	10	30	20	150	3	1	2	6	
4	**CE6004**	Environmental Engg.-I	70	20	10	30	20	150	3	1	2	6	
5	**CE6005**	Elective-II	70	20	10	-	-	100	3	1	-	4	
6	**CE6006**	Minor Project (Departmental Choice)	-	-	-	30	20	50	-	-	2	2	
7	**CE6007**	Creativity and Entrepreneurship Development (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
8	**CE6008**	Startup / Industrial Lectures (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
Total			**350**	**100**	**50**	**120**	**180**	**800**	**15**	**5**	**12**	**32**	**800**

MST: Minimum of two mid semester tests to be conducted. **L: Lecture** **T: Tutorial** **P: Practical**

- **Students have to go for Industrial Training /Internship of 4 weeks at the end of VI Semester.**

Department Elective-II (Four Subjects)	
Subject Code	**Subject Name**
CE6005A	IPR (Intellectual Property Right)
CE6005B	Geographical Information System
CE6005C	Solid Waste Management
CE6005D	Natural Disaster Mitigation and Management

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B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
WATER RESOURCE ENGINEERING-I

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Water Resource Engineering-I	CE6001	Min. "D"	Min. "D"	5.0

Unit-I

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit-II

Floods and Ground Water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. reclamation of water logged and salt affected lands.

Unit - III

Water resources planning and management: Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects. Introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

Unit - IV

Irrigation water requirement and Soil-Water-Crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

Unit – V

Canals irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics. Canal falls & cross drainage works- description and design, head and cross regulators. Escapes and outlets, canal transitions.

Well irrigation: Types of wells, well construction, yield tests, specific capacity and specific yield, hydraulic design of open wells and tube wells, method of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation

Books Reference:

1. Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
2. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
3. Engg. Hydrology - J.NEMEC - Prentice Hall
4. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
5. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
6. Engg. Hydrology by H.M. Raghunath

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Course Articulation Matrix (6th Sem CBGS)															
SUBJECT NAME	SUBJECT CODE	STATEMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO
Water Resource Engineering-I & CE6001	CO1	Choose a suitable irrigation method for any particular situation	1												
	CO2	Assess the frequency of irrigation in a catchment area		2											
	CO3	Interpret rainfall data for flood analysis		3											
	CO4	Plan water resource project				2									
	CO5	Design canals for irrigation			2										1

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
STRUCTURAL ANALYSIS – II

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Structural Analysis – II	CE6002	Min. "D"	Min. "D"	5.0

Unit - I:

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit - II:

Plastic analysis of beams and frames.

Unit - III:

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit - IV:

Matrix method of structural analysis: force method and displacement method.

Unit - V:

Influence lines for indeterminate structures, Muller Breslau principle, Analysis of Beam-Columns.

Books Reference:

1. Wang C.K. Intermediate Structural Analysis McGraw Hill New York
2. Kinney Streling J. Indeterminate structural Analysis. Addison Wesley.
3. Reddy C.S. Basic Structural Analysis, Tata Mc Graw Hill Pub. Co. New Delhi
4. Norris C.H. Wilbur J.B. and Utkys Elementary Structural Analysis, MC Graw Hill International Tokyo
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Pub.& Dis. Delhi

STRUCTURAL ANALYSIS – II LAB

List of Experiments:

1. Verify theorem of Reciprocal deflection of Maxwell reciprocal theorem using simply supported & cantilever beam
2. Verify principle of superposition for deflection using simply supported & cantilever beam
3. Draw influence line diagram for bending moment at a section of SSB using bending moment apparatus
4. Obtain horizontal thrust at support of a semicircular two hinged arch and to draw ILD for this horizontal thrust ;also to compare experimental results with analytical solutions
5. Obtain force in members of a shear leg apparatus and to compare results with analytical method
6. Obtain deflection at free end of curved member consists of a quadrant with straight edge and to compare results with those obtained by analytical method
7. Obtain elastic deflection at free end of a semicircular frame with straight edge
8. Obtain ILD for intermediate reaction of a cantilever beam of two unequal span using Muller Breslau's principle to compare results with those obtained by analytical method

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Structural Analysis-II CE6002	CO1	Analyze portal frames with sway and frames with inclined members.		3												
	CO2	Calculate plastic moment capacity and collapse load for beams and frames subjected to different loading conditions.		2												
	CO3	Analysis tall frames/ multistory buildinds subjected to wind , earthquake loads and lateral forces.		2												
	CO4	Analyze the beams and frames using matrix method of analysis.		3												VT
	CO5	Draw ILD for support reaction, SF & BM at various sections for indeterminate structures.		2												
Structural Analysis-II Lab CE6002.L	CO1	Verify Max-well's reciprocal theorem	2													
	CO2	Perform experiments to determine horizontal reaction for two and three hinged arch				2					1			1		
	CO3	Perform experiments to determine deflection and slope of beams and frames for various loading conditions.				2					1			1		

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
STRUCTT'RAL DESIGN & DRAWING - II (STEEL)

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Structural Design & Drawing- II (Steel)	CE6003	Min. "D"	Min. "D"	5.0

Unit - I :

Various loads and mechanism of the load transfer, partial load factors structural properties of steel, Design of structural connections-Bolted, Rivetted and Welded connections.

Unit - II :

Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

Unit - III :

Design of Simple beams Built-up beams, plate girders and gantry girders.

Unit - IV :

Effective length of columns, Design of columns- simple and compound , Lacings and battens. Design of footings for steel structures, Grillage foundation.

Unit - V :

Design of industrial building frames, multi-storey frames, Bracings for high rise structures. Design of transmission towers.

NOTE :

All the Designs for strength and serviceability should strictly be as per the latest version of IS:800.

Books Reference:

1. Design of Steel Structures by Subramanium
2. Design of Steel Structures by Duggle
3. Design of Steel Structures by Bhavi Katti

STRUCTT'RAL DESIGN & DRAWING - II (STEEL) LAB

List of Experiments:

1. Design & drawing of structural connection.
2. Design & drawing of members of roof trusses.
3. Design & drawing of beams & Plate Girders.
4. Design & drawing of build up Columns.
5. Design & drawing of Footing.

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Structural Design and Drawing II CE6003	CO1	Identify various loads, mechanism of load transfer and design of structural connections for Steel.		2												
	CO2	Design truss members, girder, other structural memCEr for steel buildings and transmission tower			3										2	
	CO3	Explain different types of building frames and bracing systems			3										2	
	CO4	Apply effective length of column, lacing and battens			3										2	VV
Structural Design and Drawing II Lab CE6003	CO1	Identify the major steps and symbol used in civil engineering drawings	2													
	CO2	Draw civil engineering drawing for different connections used in steel structures	2				1									
	CO3	Draw civil engineering drawing for different structural elements for steel	2				1									

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
ENVIRONMENTAL ENGINEERING – I

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Environmental Engineering - I	CE6004	Min. "D"	Min. "D"	5.0

Unit - I:

Estimation of Ground and surface water resources, quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Unit - II:

Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water, water standards for different uses. Intake structure, conveyance of water, pipe materials, pumps operation & pumping stations.

Unit - III:

Water Treatment methods theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Unit - IV:

Layout and hydraulic Design of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

Unit - V:

Rural water sypply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

Books Reference:

1. Water Supply & Sanitary Engg. By G.S. Birdi-Laxmi publications (p) Ltd. New Delhi
2. Water & Waste Water Technology by Mark J.Hammer Prentice - Hall of India, New Delhi
3. Environmental Engineering - H.S. Paeavy & D.R. Rowe Mc Graw Hill Book Co. New Delhi
4. Water & Waste Water Technology G.M. Fair & J.C. Geyer.

ENVIRONMENTAL ENGINEERING – I LAB

List of Experiments:

1. To study the various standards for water
2. To study of sampling techniques for water
3. Measurement of turbidity
4. To determine the coagulant dose required to treat the given turbid water sample
5. To determine the conc.of chlorides in a given water samples.
6. Determination of hardness of the given sample.
7. Determination of residual chlorine by chloroscope.
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved oxygen in the water sample.

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Environment Engineering-I CE6004	CO1	Compare the quality of raw water from various resources and calculate water demand based on population forecast.	1					1	1							
	CO2	Explain physical, chemical and biological drinking water standards.	2					1								
	CO3	Design Water treatment units for treatment of raw water			3											
	CO4	Design Water distribution system including hydraulic layout, leak detection and maintenance.			2											AA
	CO5	Explain water pollution control act and operation of sanitary appliance	1					1	2							
Environment Engineering-I Lab CE6004	CO1	Examine quality of raw water from various resources.		2				2			1					
	CO2	Analyze physical, chemical and biological drinking water standards.		2				3			1					

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
(ELECTIVE - II) IPR (INTELLECTUAL PROPERTY RIGHTS)

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS).	(Elective-II) IPR (Intellectual Property Rights)	CE6005A	Min. "D"	Min. "D"	5.0

Unit- I :

Introduction: Introduction and Justifications of IPR, Nature of IP, Major forms of IP- Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semi conductors, Plant varieties, Concept & Meaning of Intellectual Property.Major international documents relating to the protection of IP - Berne Convention, ParisConvention, TRIPS. The World Intellectual Property Organization (WIPO).

Unit- II :

Copyright: Meaning and historical development of copyright, Subject matter, Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and license of rights, Infringement of copyright, Exceptions of infringement, Remedies, Civil, Criminal, Administrative, Registration Procedure.

Unit- III:

Patents: Meaning and historical development,. Criteria for obtaining patents, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory license, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

Unit- IV:

Trade Marks, Designs & GI Trade Marks: Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board.

Designs: Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs.

Geographical Indication: Meaning and evolution of GI, Difference between GI and TradeMarks, Registration, Rights, Authorized user.

Unit -V :

Contemporary Issues & Enforcement of IPR: IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, E-Commerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR.

Books References:

1. P. Narayanan, Intellectual Property Law, Eastern Law House
2. NeerajPandey and Khushdeep[Dharni, Intellectual Property Rights, PHI, 2014
3. N.S Gopalakrishnan and T.G. Agitha, Principles of Intellectual Property, Eastern Book Co. Lucknow, 2009.
4. AnandPadmanabhan, Enforcement of Intellectual Property, Lexis NexisButterworths, Nagpur,2012.
5. Managing Intellectual Property The Strategic Imperative, Vinod V. Sople, PHI.
6. PrabuddhaGanguli, " Intellectual Property Rights" Mcgraw Hill Education, 2016.

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IPR (Intellectual Property and Right) CE6005.E2.A	CO1	Define differnet types of IPR with proper justification.														
	CO2	Discribe ownership, patents and Trademark														

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
(ELECTIVE - II) GEOGRAPHICAL INFORMATION SYSTEM

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS).	(Elective-II) Geographical Information System	CE6005B	Min. "D"	Min. "D"	5.0

Unit-I:

Definition of GIS, Maps & GIS, Digital representation of , Data quality and data standards, Raster and Vector based data processing, Digital Terrain modeling, Spatial analysis and modeling. Remote sensing, its terminology, Electromagnetic signatures, Atmospheric window . Active and Passive systems for remote sensing. Remote sensing applications.

Unit-II:

Principle of Aerial Photograph, Flight planning, Relief displacement of vertical photographs. Stereoscope, Parallax bar , methods of aerial photo visual interpretation keys by this instrument.

Unit- III:

Principle of Satellite image procurement, spectral reflectance curves, spatial, spectral, temporal, radiometric resolution characteristics of images. Errors of satellite images & their rectification. methods of visual interpretation of satellite images.

Unit – IV:

Projection, different types of projections and applications in image correction. projection used in India. measure of shortest distance between two points on the Earth.

Unit – V:

Remote Sensing , Technique used in Resource management (Soil, Water,) &DataBase Management system (Urban & Rural Planning) for Civil Engineering Projects. Global positioning system.

Books Reference:

1. Concept and Principle of Geographical Information system by: W.Yeung
2. Principle of Remote Sensing by Sabins
3. Manual of Remote Sensing by (A.S.R.S.) U.S.A.

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GIS CE6005.E2.B	CO1	Process GIS raster and vector data for further spatial analysis and modeling.	1		2									2	
	CO2	Compute measurements of various ground features through mathematical computations of aerial photograph.		2										2	
	CO3	Perform visual interpretation of satellite images in terms of different resolutions studied.		2		1								2	ABJ
	CO4	Apply different projection systems for image correction and calculation of shortest distance.		2										2	
	CO5	Illustrate remote sensing and GPS techniques for resource collection and database management.				2								2	

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
SOLID WASTE MANAGEMENT

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS).	(Elective-II) Solid Waste Management	CE6005C	Min. "D"	Min. "D"	5.0

Unit- I:

Introduction and Basic Data : Concept and dimension of third pollution, Survey and discussion of generation and Characterization of solid waste (physical, Biological and Chemical); Waste Reduction at the Source, Community collection methods, Critical appraisal, Rate Variation, Management Options for Solid Waste.

Unit- II :

Collection and Conveyance Systems: Volume reduction during and prior collection, Transformations and Disposal Techniques, Size reduction and classification, Collection management systems, Routing and Scheduling, Special collection problems of reuse and recycling for waste alleviation, Problems of sorting and separation..

Unit- III:

Disposal Methods: Unit operations in composting practices, Vermi-composting, Health problems and bio-degradation, Soil microbes and their influence in waste disposal, Public relation and marketing problems, unit operation of sanitary land fill, site selection and land use planning technical and economic aspects and incinerator operations, components and unit operation for waste incinerator, operation problems, high temperature, incinerator, analysis and disposal of hazardous wastes.

Unit- IV:

Solid Waste System: Solid Waste Management, Collection and conveyance system , Drying and Incineration Systems, Dewatering and Conditioning Systems , Refuse Derived fuels, Land filling, Discussion of solid waste acts, resources and recovery act of other countries rate of solid waste in total environment protection, necessity of public education and persuasion managed solutions to collection and disposal problems.

Unit- V:

EIA : Planning and Management of Environmental Impact Studies. Impact indentation methodologies : base line studies, screening, scooping, checklist, networks, overlays. Prediction and assessment of impacts on the socio-economic environment. Environmental cost benefit analysis. Sustainable development; global environmentalism.

Books References :

1. "Manual on Solid Waste Management" published by CPHEEO. Ministry of Urban Development, Government of tndia,New Delhi.
2. "solid Waste management" By A. D. Bhide and B. Sundaresan, NEERI,. Book on solid waste management indeveloping countries.
3. "Hand Book on solid Waste Management" By Frank Kreith, George Tchobanoglous

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Solid Waste Management CE6005.E2.C	CO1	Classify solid waste by its physical, biological and chemical characteistrics.		2				3	2							
	CO2	Apply proper methods of collection and conveyance to reduce solid waste.			2				2							
	CO3	Predict impact on socio economic enviroment				1			3							

B.E. (CBGS) VI SEMESTER
CIVIL ENGINERRING
(ELECTIVE - II) NATURAL DISASTER MITIGATION AND MANAGEMENT

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS).	(Elective-II) Natural Disaster Mitigation and Management	CE6005D	Min. "D"	Min. "D"	5.0

Unit-I:

Natural Disasters — Overview:

Introduction, Natural Disasters around the world, Natural Disaster Risk Assessment, Earth and its characteristics, Environmental Change and Degradation, Climate Change, Global warming, Human Dimensions of Global environment Change, Disaster mitigation, preparedness, response and recovery, comprehensive emergency management Early warning systems and Disaster Preparedness, Rehabilitation, Vulnerable Populations, Logistics and Services, Food, Nutrition and Shelter, Role of UN Red cross and NGOs.

Unit-II:

Plate Tectonics& Earthquakes:

Introduction and Review, Natural Disasters, Principles, Elements, and Systems, Geological, Geo-morphological aspects, Earthquake, Geology, Seismology, Characteristics and dimensions, Landslides, Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc., Tsunami, Nature and characteristics.

Unit - III:

Critical climate system aspects and Processes:

Oceanic, Atmospheric and Hydrologic cycles, Severe Weather & Tornadoes , Cyclones, Floods and Droughts, Global Patterns, Mitigation & Preparation, Drought, Famine, nature & dimensions, Drought Assessment & Monitoring.

Unit- IV:

Natural hazards Assessment and Communication:

Mapping, Modeling, risk analysis and loss estimation, Natural disaster risk analysis, prevention and mitigation, Applications of Space Technology (Satellite Communications, UPS, GIS and Remote Sensing and Information I Communication Technologies (ICT) in Early warning Systems, Disaster Monitoring and Support Centre, Information Dissemination, Mobile Communications etc.

Unit V:

Administrative mechanisms:

Comm Moduley and Social organizations, Education and Training, Establishment of capacity building among various stakeholders, Government, Educational institutions, Use of Multi-media knowledge products for self-education.

Books Reference:

1. Edward A Keller, Robert H Blodgett, Natural Hazards: Earth's Processes as I lazards,Disasters, and Catastrophes, Pearson Prentice Hall.
2. Didax, Natural Disasters, Didax Educational Resources.
3. Edward Bryant, Natural Hazards, Cambridge University Press, New York.
4. Robert L Kovach Earth's Fury, An Introduction to Natural Hazards and Disasters, Prentice Hall.
5. Davi Alexander, Natural Disasters, Routledge.

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(Elective-II) Natural Disaster Mitigation and Management

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Natural Disaster Mitigation and Management CE6005.E2.D	CO1	Summarize the causes of natural disaster and its preventive measures.	2						2					1		
	CO2	Explain principles, elements and characteristics of natural disasters	2						2					1		
	CO3	Summarize critical climatic systems.	2						2					1		ABJ
	CO4	Categorize different modelling methods for natural hazards assessment.	2			1			2							
	CO5	Explain administrative mechanism for disaster mitigation.	2			1			2							