गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
कोनी, बिलासपुर – 495009 (छ.ग.)

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List of Revised Courses

Department	:	Civil Engineering
Programme Name	: B.Tech in Civil Engineering	
Academic Year : 2023-24		

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	AMUATB1	ENGINEERING MATHEMATICS – A-100%
02.	AMUBTB4	ENGINEERING MATHEMATICS – B-100%
03.	CE205PPC05	SOIL MECHANICS LAB -35%
04.	CE07TPE04A	ENGINEERING HYDROLOGY -30%

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Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year: **2023-24**	
School	: *Engineering and Technology*
Department	: *Civil Engineering*
Date and Time: 05-10-2023	
Venue	: Through Google meet

Department of Civil Engineering
School of Studies of Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur C.G.

Minutes of Meeting of BoS

A meeting of the Board of Studies (BoS) of Civil Engineering was held on 05-10-2023 at 04:00 PM online/Offline (through Google Meet) in the Department of Civil Engineering. The following members of BoS were present in the meeting.

1. Dr. A. K. Parashar, Chairman BoS, Head of the Department Civil Engg.
2. Prof. M. L. Agrawal, Principal, Institute of Technology, Korba, C.G., Subject Expert and External Member of BoS (Attended Online)
3. Shri. Ajay Somawar, Chief Engineer, Hasdeo Basin, Bilaspur and External Member of BoS (Attended Online)
4. Prof. Shailendra Kumar, Professor, Civil Engg. Dept., GGV, Member of BoS
5. Prof. M. Chakradhara Rao, Professor, Civil Engg. Dept., GGV, Member of BoS
6. Prof. R.K. Choubey, Professor, Civil Engg. Dept., GGV, Member of BoS
7. Dr. V. V. S. S. K. Dadi, Associate Professor, Civil Engg. Dept., GGV, Member of BoS
8. Mr. Prakhar Modi, Assistant Professor, Civil Engg. Dept., GGV, Member of BoS

At the outset, the chairman welcomed all the esteemed members.

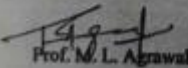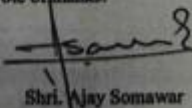In the meeting members discussed the following Agenda item.

Agenda Item: To finalize and approve the scheme and syllabus for B.Tech. Civil Engineering 3rd and 4th semester (NEP) w.e.f. session 2023-24.

The chairman of the BoS has presented the B.Tech. Civil Engineering Scheme and the syllabus of B.Tech. 3rd and 4th semester, prepared as per NEP 2020 & the AICTE guidelines to all the esteemed members. In the meeting the members discussed the proposed scheme and syllabus at length.

Resolution: After discussion, the members resolved the following.

(i) The course code of all the subjects proposed in the scheme shall be as per the university order vide no.284/Acad./2019, dated 27/09/2019.

(ii) As the students study one course related to Effective Technical Communication in 1st Year, so the same is to be removed from the proposed scheme in 2nd year (4th Sem).

With the above modifications, the members of BoS approved the proposed B.Tech. scheme and detailed syllabus of B.Tech. 3rd and 4th semester w.e.f. session 2023-24.

The meeting ended with vote of thanks.

Prof. M. L. Agrawal	Shri. Ajay Somawar	Prof. Shailendra Kumar	Prof. M. Chakradhara, Rao
Prof. R.K. Choubey	Dr. V. V. S. S. K. Dadi	Dr. A. K. Parashar	Mr. Prakhar Modi

Program Revision

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Department of Civil Engineering
School of Studies of Engineering & Technology
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Minutes of Meeting of BoS

A meeting of the Board of Studies (BoS) of Civil Engineering was held on 22-03-2023 at 04:00 PM online/Offline (through Google Meet) in the Department of Civil Engineering. The following members of BoS were present in the meeting.

1. Dr. A. K. Parashar, Chairman BoS, Head of the Department Civil Engg.
2. Prof. M. L. Agrawal, Principal, Institute of Technology, Korba, C.G., Subject Expert and External Member of BoS (Attended Online)
3. Shri. Ajay Somawar, Chief Engineer, Hasdeo Basin, Bilaspur and External Member of BoS (Attended Online)
4. Prof. Shailendra Kumar, Professor, Civil Engg. Dept., GGV, Member of BoS
5. Prof. M. C. Rao, Professor, Civil Engg. Dept., GGV, Member of BoS
6. Prof. R.K. Choubey, Professor, Civil Engg. Dept., GGV, Member of BoS
7. Dr. V. V. S. S. K. Dadi, Associate Professor, Civil Engg. Dept., GGV, Member of BoS
8. Mr. Prakhar Modi, Assistant Professor, Civil Engg. Dept., GGV, Member of BoS

At the outset, the chairman welcomed all the esteemed members.

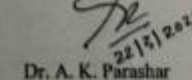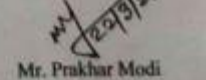In the meeting members discussed the following two Agenda items and resolved as under.
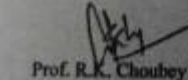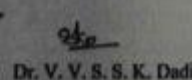
Agenda Item No.1. M.Tech.

Certain modifications in the three subjects of the M.Tech. existing syllabus as proposed by the department of civil engineering was perused by the members and after discussion it was approved the proposed changes/modifications in three subjects of M.Tech. (Structural Engineering) syllabus viz: i) Advanced Structural Analysis (I Sem) w.e.f. 2023-24 session; ii) Finite Element Method in Structural Engineering (II Sem) w.e.f. 2022-23 session and iii) Design of Advanced Concrete Structures (II Sem) w.e.f. 2022-23 session.

Agenda Item No.2. B.Tech. First year.

The syllabus of B.Tech. First year as per the NEP2020 for the academic session 2022-23 was approved by the members of Board of Studies of Civil Engineering Department on 15-12-2022 through e-mail. The above approved syllabus has been made effective from 2022-23. In this meeting, members confirmed the above approval.

The meeting ended with a vote of thanks.

Prof. M. L. Agrawal   Shri. Ajay Somawar   Prof. Shailendra Kumar   Prof. M. C. Rao
                                                                    22/03/2023

Prof. R.K. Choubey   Dr. V. V. S. S. K. Dadi   Dr. A. K. Parashar   Mr. Prakhar Modi
                                                      22/3/2022   22/3/23

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Scheme and Syllabus

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
Scheme of Teaching and Evaluation 2022-2023 (As per NEP-2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
(Effective from the Academic Year 2022–2023)

I-SEMESTER BTech Mechanical/IP/Chemical/Civil Engineering

S.N.	Course Code	Course Title	Teaching Hours/week			Examination				Credits
			Theory/Lecture (L)	Tutorial (T)	Practical/Drawing (P)	Examination/min Hours	CEA Marks	SEA Marks	Total Marks	
1	AMUATR1	Engineering Mathematics - A	3	1	-	03	40	60	100	4
2	CYUATR3	Engineering Chemistry	3	-	-	03	40	60	100	3
3	ECUATR4	Basic Electrical and Electronics Engineering	3	-	-	03	40	60	100	3
4	FOUATC2	Environmental Science and Ecology	2	-	-	03	40	60	100	2
5	CSUATR5	Computer Programming	3	-	-	03	40	60	100	3
6	LAUATC3	Indian Constitution	1	-	-	01	50	-	50	1
7	CYUALR3	Engineering Chemistry Laboratory	-	-	2	03	25	25	50	1
8	CSUALR5	Computer Programming Laboratory	-	-	2	03	25	25	50	1
9	IPUALL2	Engineering Workshop Practices	-	-	2	03	25	25	50	1
10	PEUALS2	Sports and Yoga	-	-	2		25	25	50	1
		Total	**15**	**1**	**08**	**25**	**350**	**400**	**750**	**20**

Note: AM:Mathematics, PP:Physics, ME: Mechanical Engineering, IP: Industrial & Production Engineering, CE: Civil Engineering, CS: Computer Sc. & Engg., IT: Information Technology, PE: Physical Education, FO: Forestry, LA: Law, NS: NSS, U: Undergraduate, T: Theory, L: Laboratory,

BASIC SCIENCE (B)	ENGINEERING SCIENCE (E)	SKILL ENHANCEMENT COURSE (L)	HUMANITIES SCIENCE (H)	MANDATORY COURSE (C)	EXTRA-CURRICULAR ACTIVITIES (S)
1. Mathematics – A 2. Physics 3. Chemistry 4. Mathematics – B	1. Engineering Mechanics 2. Introduction to Information Technology 3. Basic Electrical Engineering 4. Basic Electrical and Electronics Engineering 5. Computer Programming 6. Basic Communication Engineering	1. Engineering Graphics 2. Engineering Workshop Practices	1. English for communication 2. Human Values and Ethics	1. Indian Constitution 2. Environmental Science & Ecology	1. NSS 2.Sports and Yoga

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SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
Scheme of Teaching and Evaluation 2022-2023 (As per NEP-2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
(Effective from the Academic Year 2022–2023)

II-SEMESTER BTech Mechanical/IP/Chemical/Civil Engineering

S.N.	Course Code	Course Title	Theory lecture L	Tutorial T	Practical/ Drawing P	Examination in Hours	CIA Marks	SEA Marks	Total Marks	Credits
1	AMURTB4	Engineering Mathematics-B	3	1	-	03	40	60	100	4
2	PPURTB2	Engineering Physics	3	1	-	03	40	60	100	4
3	ITURTE2	Introduction to Information Technology	3	-	-	03	40	60	100	3
4	ELURTH3	English for Communication	3	-	-	03	40	60	100	3
5	CEURTE1	Engineering Mechanics	3	-	-	03	40	60	100	3
6	ME URTH2/CH URTH2/ IP URTH2/CEURTH2	Human Values and Ethics	1	-	-	02	50	-	50	1
7	PPURLR2	Engineering Physics Laboratory	-	-	2	03	25	25	50	1
8	CEURLE1	Engineering Mechanics Laboratory	-	-	2	03	25	25	50	1
9	MEURLL1	Engineering Graphics	1	-	3	03	25	25	50	3
10	NSURLS1	NSS	-	-	2	01	25	25	50	1
		Total	17	2	09	27	350	400	750	24

Note: AM:Mathematics, PP:Physics, ME: Mechanical Engineering, IP: Industrial & Production Engineering, CE: Civil Engineering, CS: Computer Sc. & Engg., IT: Information Technology, PE: Physical Education, NS: NSS, U: Undergraduate, T: Theory, L: Laboratory,

BASIC SCIENCE (B)	ENGINEERING SCIENCE (E)	SKILL ENHANCEMENT COURSE (L)	HUMANITIES SCIENCE (H)	MANDATORY COURSE (C)	EXTRA-CURRICULAR ACTIVITIES (S)
1. Mathematics – A 2. Physics 3. Chemistry 4. Mathematics – B	1. Engineering Mechanics 2. Introduction to Information Technology 3. Basic Electrical Engineering 4. Basic Electrical and Electronics Engineering 5. Computer Programming 6. Basic Communication Engineering	1. Engineering Graphics 2. Engineering Workshop Practice	1. English for communication 3. Human Values and Ethics	1. Indian Constitution 2. Environmental Science & Ecology	1. NSS 2.Sports and Yoga

CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH.V SEMESTER CIVIL ENGINEERING(CBCS-2020-21)
W.E.F. 2022-23 (ODD SEMESTER)

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation			ESE	Grand Total	Credits
						Internal Assessment (IA)					
		Theory	L	T	P	CT-I	CT-II	Total	ESE	Grand Total	Credits
1	CE205TPC09	Design of Concrete Structures-I	3	1	0	15	15	30	70	100	4
2	CE205TPC10	Structural Analysis - II	3	1	0	15	15	30	70	100	4
3	CE205TPC11	Transportation Engineering	3	0	0	15	15	30	70	100	3
4	CE205TPC12	Soil Mechanics - I	3	0	0	15	15	30	70	100	3
5	CE205TPC13	Environmental Engineering - I	3	0	0	15	15	30	70	100	3
6	CE205TPC14	Estimation & Costing	3	0	0	15	15	30	70	100	3
		Practical									
1	CE205PPC04	Transportation Engineering Lab	0	0	2	-	-	30	20	50	1
2	CE205PPC05	Soil Mechanics Lab	0	0	2	-	-	30	20	50	1
										Total Credits	22

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Mandatory Course

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DEPARTMENT OF CIVIL ENGINEERING B.TECH. FOURTH YEAR SYLLABUS W.E.F 2022-23

SYLLABUS
(SEMESTER-VII)

Subject Code:	CE07TPE04X	CREDITS:3			SESSIONAL - TA			ESE
Subject:	Professional Elective - 4X	L	T	P	CT 1	CT 2	TOTAL	70
		3	-	-	15	15	30	

Professional Elective-4A or Professional Elective-4B or Professional Elective-4C or Professional Elective-4D or Professional Elective-4E	Any one subject to be Selected from the Professional Electives

Professional Electives Group -4	
CE07TPE04A	Engineering Hydrology
CE07TPE04B	Structural Dynamics
CE07TPE04C	Foundation Engineering
CE07TPE04D	Rock Mechanics
CE07TPE04E	Water Resources Planning & Management

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SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	Attendance & Assignments	TOTAL			
Subject Code:	AMUATB1								60	100	04
Subject:	ENGINEERING MATHEMATICS - A	3	1	-	15	15	10	40			

Course Objectives:
1. To study the mean value theorem and nth derivative.
2. To study the indeterminate forms, partial and total differentiation.
3. To study the various concepts of integral calculus such as reduction formula, area, volume and length.
4. To study the ordinary and partial differential equations.
5. To study the applications of ordinary and partial differential equations

Differential Calculus

UNIT-1:
Leibnitz theorem, Roll's theorem, Lagrange's theorem, Mean value theorem, Expansions of functions by McLaurian and Taylor's series, Tangents and normal, Maxima and minima

UNIT-2:
Indeterminate forms, Asymptotes, Radius of curvature, Partial differentiation, Total differentiation

Integral Calculus

UNIT-3:
Reduction formulae, Curve tracing, Area, Volume, Length, Surface area, Double and triple integrals, Gamma and beta function.

Differential Equations

UNIT-4:
Differential equations of first order, Linear differential equation of higher order with constant coefficient, Equations reducible to linear equations with constant coefficients, Cauchy's homogeneous linear equations, Application of linear differential equations, Simultaneous differential equations.

UNIT-5:
Series solution of differential equations about ordinary point, Partial differential equations, linear homogeneous partial differential equations, application of partial differential equations: One dimensional heat equation and wave equation.

Recommended Books:

1. N.P. Bali, A Textbook of Engineering Mathematics, Laxmi publications, 10th edition, 2016.
2. H.K. Das, Higher Engineering Mathematics, S. Chand, 2014
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th edition

Course Outcomes: After completing the course, the students will be able to:
1. Expand the function in Maclaurin's and Taylor's series.
2. Find the limit of some indeterminate forms and solve the problems of partial and total differentiation.
3. Solve the problems related to area, volume and length.

4. Solve the ordinary and partial differential equations.
5. Solve the engineering problems using differential equations.

Course Outcomes and their mapping with Programme Outcomes: ENGINEERING MATHEMATICS – A (AMUATB1)

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		1	1				1	2		2	1	1	2
CO2	3	2		1	1				1	2		2	1	1	2
CO3	3	2		1	1				1	2		2	1	1	2
CO4	3	3		1	1				1	2		2	1	1	2
CO5	3	3		1	1				1	2		2	1	1	2

Weightage: 1-Slightly, 2-Moderately, 3-Strongly

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SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	AMUBTB4	L	T	P	CT-1	CT-II	Attendance & Assignments	TOTAL	60	100	04
Subject:	ENGINEERING MATHEMATICS - B	3	1	-	15	15	10	40			

Course Objectives:
1. To study the concepts of vector space, linear transformation, matrices and system of linear equations.
2. To find the roots of equations i.e. quadratic and bi-quadratic equations.
3. To study the concept of gradient, divergence, curl, Green's theorem, Gauss's theorem and Stokes's theorem and their applications.
4. To study the properties of complex numbers and to establish the relation between exponential, hyperbolic and logarithm functions.
5. To test the nature of infinite series i.e. convergence, divergence and oscillatory.

UNIT-1: Linear Algebra
Vector space, linear dependence and linear independence of vectors, linear transformations, rank and inverse by elementary transformations, system of linear equations – consistency and inconsistency, eigen value and eigen vectors, Caley-Hamilton theorem and its application to find the inverse.

UNIT-2: Theory of equations
Polynomial and polynomial equations, division algorithm, roots of equations, remainder theorem, factor theorem, synthetic division, fundamental theorem of algebra, multiplication of roots, descarte's rule of sign, Descarte's method.

UNIT-3: Vector Calculus
Vector functions, differentiation of vectors, velocity and acceleration, scalar and vector fieldm gradient of scalar field, directional derivative, properties of gradient, divergence of vector, curl of vector, point function, properties of divergence and curl, integration of vector function, line integral, surface integral, Green's theorem, gauss theorem, Stoke's theorem (without proof) and their simple applications.

UNIT-4: Complex Number
Complex numbers and its properties, conjugate complex numbers, standard form of complex numbers, De-Moivre's theorem, Roots of complex numbers, exponential function of complex variable, circular form of complex variable, Hyperbolic function of complex numbers, Logarithmic function of complex numbers.

UNIT-5: Infinite Series
Sequence, convergent, divergent, oscillating sequence, infinite series, behavior of infinite series, ratio test, root test, comparison test, Raabe's test, Logarithmic test.

Recommended Books:

1. N.P. Bali, A Textbook of Engineering Mathematics, Laxmi publications, 10th edition, 2016.
2. H.K. Das, Higher Engineering Mathematics, S. Chand, 2014
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th edition

Course Outcomes: After completion of this course, the students will be able:
1. To know the concept of vector space, matrices and their various properties and also be able to solve the system of linear equations.
2. To solve the quadratic and bi-quadratic equations.

3. To solve the problems of gradients, divergent, curl and the applications of vector calculus.
4. To find the roots of complex numbers with the help of De-Moivre's theorem.
5. To know the convergence and divergence of infinite series using various type of tests.

Course Outcomes and their mapping with Programme Outcomes: ENGINEERING MATHEMATICS – B (AMUBTB4)

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		1	1				1	2		2	1	1	2
CO2	3	2		1	1				1	2		2	1	1	2
CO3	2	2		1	1				1	2		2	1	1	2
CO4	2	2		1	1				1	2		2	1	1	2
CO5	2	2		1	1				1	2		2	1	1	2

Weightage: 1-Slightly, 2-Moderately, 3-Strongly

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DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2022-23

SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL	20	50	1
Subject Code:	CE205PPC05	0	0	2	-	-	30			
Subject:	Soil Mechanics Lab									

Course Learning Objectives:

The objective of this Course is:

- To learn the basic tests for classification of different soils.
- To conduct compaction tests for laboratory and in –situ.
- To learn the sampling of soil.

Course Content:

Minimum 10 experiments to be performed

Determination of Index Properties

1. To determine the specific gravity of soil sample by , a) Pycnometer Bottle Method., b) Density Bottle Method.
2. To determine the particle size distribution of a soil by a) by Mechanical Analysis/IS Sieve Method., b) by Hydrometer apparatus.
3. Liquid limit and Plastic limit Tests.
4. Shrinkage limit and Differential free swell test.

Determination of In -Situ Density and Compaction Characteristics

5. To determine the minimum moisture content (OMC) at maximum dry density (MDD) of soil by, a) Light weight Proctor Test, b) Heavy Weight Proctor Test.
6. To determine in situ dry density of soil by a) Core cutter method. b) Sand replacement method.

Determination of Engineering Properties- Part A

7. To determine the permeability of soil by a) Falling Head Methods, b) Constant Head Methods.
8. To determine the shear strength parameters a) Direct shear test in cohesionless soil, b) Unconfined compression test in cohesive soil

Determination of Engineering Properties- Part B

9. To determine the shear strength parameters for a) Tri-axial compression test in c-φ Soil (Demonstration only). b) One dimensional consolidation test (Determination of co-efficient of consolidation only), c) Laboratory vane shear test in cohesive soil.
10. California Bearing Ratio Test.

TextBooks:

1. Soil Engineering Laboratory Instruction Manual" published by Engineering College Co- operative Society, Anna University, Chennai, 2010.
2. "Saibaba Reddy, E. Ramasastri, K. "Measurement of Engineering Properties of Soils", New age International (P) limited publishers, New Delhi, 2008.
3. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1951. Digitized 2008.
4. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.
5. G.Venkatappa Rao and Goutham .K. Potable, "Geosynthetics Testing – A laboratory Manual", Sai Master Geoenvironmental Services Pvt. Ltd., 1st Edition 2008.
6. BrajaM.Das., "Soil Mechanics: Laboratory Manual", Oxford University Press, eighth edition, 2012

REFERENCES:

1. Basic and Applied Soil Mechanics by GopalRanjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain &Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002

Course Outcomes

On completion of the course, the student is expected to be able to:

CO1: Conduct tests to determine the index properties of soils
CO2: Determine the density and compaction characteristics in laboratory as well as in situ.
CO3: Conduct tests to find permeability and shear strength of soils (c & φ)
CO4: Understand various tests to find c & φ parameters, compressibility and CBR value.

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गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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DEPARTMENT OF CIVIL ENGINEERING B.TECH. FOURTH YEAR SYLLABUS W.E.F 2022-23

SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL	70	100	3
Subject Code:	CE07TPE04A									
Subject:	Engineering Hydrology	3	0	0	15	15	30			

Course Learning Objectives:

- To develop the fundamentals of hydrology and Precipitation.
- To study various abstractions of precipitation.
- To understand the concepts of Rainfall-Runoff correlations
- To learn about the importance of Hydrographs and the basics of the flood.
- To understand the fundamentals of groundwater hydrology

Course Content:

UNIT-1 Introduction Description of Hydrologic Cycle, Overview of the applications of hydrology in engineering, Forms of precipitation, measurement, depth-area-duration, and intensity-duration frequency relations.

UNIT–2 Abstraction from Precipitation, Evaporation - process, measurement, and estimation, Evapotranspiration measurement and estimation Infiltration process, measurement, and estimation.

UNIT-3 Runoff Surface Runoff and Stream Flow Measurements, Rainfall-Runoff relations.

UNIT- 4 Hydrograph Factors affecting flow hydrograph, Unit hydrograph, its analysis, and S-curve hydrograph, Synthetic and instantaneous unit hydrographs. Basics of Flood and Flood Routing.

UNIT- 5 Groundwater Occurrence of groundwater, types of aquifers, aquifer properties, Darcy's law, Conductivity and Transmissivity, the yield from a well under steady-state conditions, Laboratory and field measurement of permeability

Text Books:

1. Engineering Hydrology K.Subramanya, Tata McGraw-Hill Education
2. Hydrology Principles, Analysis and Design H.M.Raghunath, New Age International
3. Hand Book of Applied hydrology V.T.Chow, McGraw-Hill,Inc
4. Ojha,C.S.P. , Bhunya, P. and Berndtsson, R.- Engineering Hydrology, Oxford University Press Canada.
5. K. C. Patra, Hydrology and Water Resources Engg., Narosa Publishing house, New Delhi.
6. D. K. Todd, Groundwater Hydrology, John Wiley and Sons

Course Outcomes- Upon completion of this course students shall be able to

CO1: Describe the basic concepts of hydrology and precipitation to integrate them with the physical hydrological processes.
CO2: Understand the various process and conduct measurements, and estimations of hydrological components
CO3: Formulate the rainfall-runoff relationship and apply it to engineering practices.
CO4: Explain and use the hydrographs for practical purposes and investigations.
CO5: Understand and explain the basics of groundwater hydrology.