



List of Revised Courses

Department : Chemical Engineering

Programme Name : B.Tech. Chemical Engineering

Academic Year :

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	AMUATB1	Engineering Mathematic-A
02.	AMUBTB4	Engineering Mathematic-B
03.	ECUATE4	Basic Electrical & Electronics Engineering
04.	CEUBTE1	Engineering Mechanics
05.	CH306TPC12	Process Dynamics and Control



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

Academic Year : 2022-23

School : School of Engineering and Technology

Department : Chemical Engineering

Date and Time : 15 December 2022, 11:00 AM

Venue : HoD Room

Minutes of Meeting

The scheduled meeting of members of Board of Studies (BoS) of Department of Chemical Engineering, School of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held today (December 15, 2022) in blended mode (offline plus via Google Meet) to discuss the B.Tech. First year (I and II semesters) scheme and syllabi and minor correction in the Scheme of B.Tech. VI Semester.

The following members were present in the meeting

1. Prof. A. B. Soni, External Expert Member-BoS (Prof., Dept. of Chemical Engg., NIT Raipur)
2. Dr. Raghendra Singh Thakur, Chairman-BoS (Assistant Prof. and Head, Dept. of Chemical Engg.)
3. Dr. Anil Kumar Chandraker, Member-BoS (Associate Prof., Dept. of Chemical Engg.)
4. Dr. Saurabh Meshram, Member-BoS (Assistant Prof., Dept. of Chemical Engg.)
5. Dr. Arvind Verma, External Industry Expert, Special Invitee-BoS (Senior Manager-Process, Nu-Vista (NUVOCO Cement), Baloda Bazar)
6. Dr. Amt Jain, Invited Member (Associate Professor, Dept. of Chemical Engg.)
7. Mr. Neeraj Chandraker, Invited Member (Assistant Prof., Dept. of Chemical Engg.)
8. Mrs. Anuradha N. Joshi, Invited Member (Assistant Prof., Dept. of Chemical Engg.)
9. Mr. Gautam Prasad Dewangan, Invited Member (Assistant Prof., Dept. of Chemical Engg.)
10. Mr. Vishnu Prasad Yadav, Invited Member (Assistant Prof., Dept. of Chemical Engg.)
11. Dr. Sandeep Dharmadhikari, Invited Member (Assistant Prof., Dept. of Chemical Engg.)
12. Dr. Ghoshna Jyoti, Invited Member (Assistant Prof., Dept. of Chemical Engg.)

Following observations have been made in the meeting.

1. The committee discussed the scheme and syllabi of B. Tech First year (I and II semesters) at length and approved. The final scheme and syllabi are to be sent to the external BoS members for their formal consent.
2. As per the BOS meeting held on 14/06/2022, in B.Tech. III Year (VI Sem.) scheme (BoS held on 14.06.2022), the subject "Essence of Indian Knowledge Tradition" (Subject code: CH306TMC02) was inadvertently assigned with following scheme:

[Handwritten signatures and dates: 15/12/2022, 15/12/2022, 15/12/2022, 15/12/2022, 15/12/2022, 15/12/2022]



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/Lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIA Marks	SEA Marks	Total Marks	
			L	T	P					
1	AMUATB1	Engineering Mathematics - A	3	1	-	03	40	60	100	4
2	CYUATB3	Engineering Chemistry	3	-	-	03	40	60	100	3
3	ECUATE4	Basic Electrical and Electronics Engineering	3	-	-	03	40	60	100	3
4	FOUATC2	Environmental Science and Ecology	2	-	-	03	40	60	100	2
5	CSUATE5	Computer Programming	3	-	-	03	40	60	100	3
6	LAUATC1	Indian Constitution	1	-	-	01	50	-	50	1
7	CYUALB3	Engineering Chemistry Laboratory	-	-	2	03	25	25	50	1
8	CSUALE5	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) 1. Mathematics - A 2. Physics 3. Chemistry 4. Mathematics - B		ENGINEERING SCIENCE (E) 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		SKILL ENHANCEMENT COURSE (L) 1. Engineering Graphics 2. Engineering Workshop Practices		HUMANITIES SCIENCE (H) 1. English for communication 2. Human Values and Ethics		MANDATORY COURSE (C) 1. Indian Constitution 2. Environmental Science & Ecology		EXTRA-CURRICULAR ACTIVITIES (S) 1. NSS 2. Sports and Yoga



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	Teaching Hours/week			Examination				Credits
			Theory lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIA Marks	SEA Marks	Total Marks	
			L	T	P					
1	AMUBTB4	Engineering Mathematics-B	3	1	-	03	40	60	100	4
2	PPUBTB2	Engineering Physics	3	1	-	03	40	60	100	4
3	ITUBTE2	Introduction to Information Technology	3	-	-	03	40	60	100	3
4	ELUBTH1	English for Communication	3	-	-	03	40	60	100	3
5	CEUBTE1	Engineering Mechanics	3	-	-	03	40	60	100	3
6	ME UBTH2/CH UBTH2/ IP UBTH2/CEUBTH2	Human Values and Ethics	1	-	-	02	50	-	50	1
7	PPUBLB2	Engineering Physics Laboratory	-	-	2	03	25	25	50	1
8	CEUBLE1	Engineering Mechanics Laboratory	-	-	2	03	25	25	50	1
9	MEUBLL1	Engineering Graphics	1	-	3	03	25	25	50	3
10	NSUBLS1	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 Practices		1. English for communication 2. Human Values and Ethics		1. Indian Constitution 2. Environmental Science & Ecology		1. NSS 2. Sports and Yoga



SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University Established by the Central University Ordinance 2009, No. 3 of 2009)

SCHEME FOR EXAMINATION (Effective from session 2022-23)

B. TECH. (FOUR YEAR) DEGREE COURSE, CHEMICAL ENGINEERING

THIRD YEAR, FIFTH SEMESTER (AICTE-NEW)

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme			Credits
	THEORY					Sessional			
				L	T	P	IA	ESE	
01.	CH305TPC07	Heat Transfer	3	1	0	30	70	100	4
02.	CH305TPC08	Mass Transfer-I	3	1	0	30	70	100	4
03.	CH305TPC09	Chemical Reaction Engineering-I	3	1	0	30	70	100	4
04.	CH305TPC10	Process Equipment Design-I	3	1	0	30	70	100	4
05.	CH305TPE1X		3	0	0	30	70	100	3
06.	CH305TPE2X		3	0	0	30	70	100	3
PRACTICAL									
01.	CH305PPC05	Heat Transfer Lab	0	0	3	30	20	50	1.5
02.	CH305PPC06	Chemical Reaction Engineering Lab	0	0	3	30	20	50	1.5
Total			18	4	6	240	460	700	25

IA - Internal Assessment

ESE - End Semester Examination

Total Credits - 25

Total Marks - 700

Total Periods / week - 28

Sishe

Gaur

K. Anil

Pradeep

Dr. Gaur

Dr. Gaur

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SCHEME FOR EXAMINATION (Effective from session 2022-23)

B. TECH. (FOUR YEAR) DEGREE COURSE, CHEMICAL ENGINEERING

THIRD YEAR, SIXTH SEMESTER (AICTE)

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme			Credits
	THEORY					Sessional			
				L	T	P	IA	ESE	
01.	CH306TPC11	Mass Transfer-II	3	1	0	30	70	100	4
02.	CH306TPC12	Process Dynamics and Control	3	1	0	30	70	100	4
03.	CH306TPC13	Chemical Reaction Engineering-II	3	1	0	30	70	100	4
04.	CH306TPE3X		3	0	0	30	70	100	3
05.	CH306TMC02	Essence of Indian Knowledge Tradition	2	0	0	30	70	100	3
06.		Open Elective	3	0	0	30	70	100	3
PRACTICAL									
01.	CH306PPC07	Mass Transfer Lab	0	0	3	30	20	50	1.5
02.	CH306PPC08	Process Dynamics and Control Lab	0	0	3	30	20	50	1.5
Total			18	3	6	240	460	700	24

IA - Internal Assessment

ESE - End Semester Examination

Total Credits - 24

Total Marks - 700

Total Periods / week - 27

R. Gaur

K. Anil

Pradeep

Sishe



SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY

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DEPARTMENT OF CHEMICAL ENGINEERING

List of Professional Elective Courses (Fifth and Sixth Semester)

S.No.	Semester	Course No.	Subjects
01.	V	CH305TPE11	Engineering Materials
02.		CH305TPE12	Polymer Technology
01.	V	CH305TPE21	Inorganic Chemical Technology
02.		CH305TPE22	Fluidization Engineering
01.	VI	CH306TPE31	Organic Chemical Technology
02.		CH306TPE32	Fuel Combustion Energy Technology

(Signatures)



List of open electives for 6th semester B.Tech students

S.No	Course code	Course name	Offered by
1	CH206TOE01	Industrial utilities and safety	Chemical
2	CE206TOE01	Metro systems and Engineering	Civil
3	CS206TOE01	Object Oriented Programming with C++	CSE
4	EC206TOE01	Introduction to electronic devices and circuits	ECE
5	IP206TOE01	Operation Research	IPE
6	IT206TOE01	Computer Graphics	IT
7	ME206TOE01	Automobile Engineering	MECH





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

Differential Calculus

100%

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

8/11/25



SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	ECUATE4	L	T	P	CT-I	CT-II	Attendance & Assignments	TOTAL			
Subject:	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	-	-	15	15	10	40	60	100	03

Course Learning Objectives:

20%

- To provide knowledge for the analysis of DC and AC circuits.
- To explain the working principle, construction, applications of Transformer
- Study of DC machines and AC machines.
- To impart knowledge of analog and digital electronics

Unit-I: DC CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Ohm's Law, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Mesh & nodal analysis, Star- Delta Transformation.

Time-domain analysis of first-order RL and RC circuits.

Unit-II: AC CIRCUITS

Representation of sinusoidal waveforms, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections. Three-phase power measurement- Two- Wattmeter method.

UNIT-III: ELECTRICAL MACHINES

Construction, classification, ideal and practical transformer, equivalent circuit, losses in transformers, tests, voltage regulation and efficiency.

Introduction to DC Machines and three phase Induction Machine

Unit-IV: ANALOG and DIGITAL ELECTRONICS

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Introduction to Bipolar Junction Transistor.

Binary Number System, Logic Gates, Combinational circuits, Boolean Algebra, De Morgan's Theorem, Half and Full Adders.

UNIT V: Simulation and analysis of DC and AC circuits. Testing on single phase transformer. Demonstration of DC and AC machines. Basic analog and digital applications

Suggested Text / Reference Books:

- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
- B L Theraja & AK Theraja, "A Textbook of Electrical Technology- Vol-I & II, S. CHAND & Co Ltd, 2013.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics - Analog and Digital Circuit and Systems", 2nd Edition 2017
- Robert L Boylestad, Louis Nashelsky, "Electronics devices and circuit theory", Pearson 11th edition 2013
- M. Morris Mano, "Digital Logic and Computer Design", Pearson, 2004.

Course Outcomes:

At the end of the course, students will be able to:

- ☑ Analyze DC and AC circuits.
- ☑ Understand the working principle of Transformer, DC and AC machines.
- ☑ Understand the characteristics and working of diodes and transistors.
- ☑ Understand the basics of digital circuits and its importance.



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			
Subject:	ENGINEERING MATHEMATICS - B	3	1	-	15	15	10	40	60	100	04

UNIT-1: Linear Algebra

100%

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, Descartes's rule of sign, Descartes's method.

UNIT-3: Vector Calculus

Vector functions, differentiation of vectors, velocity and acceleration, scalar and vector field, 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



SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	CEUBTE1	L	T	P	CT- I	CT- II	Attendance & Assignments	TOTAL			
Subject:	ENGINEERING MECHANICS	3	0	-	15	15	10	40	60	100	03

30%

UNIT – I

INTRODUCTION: Basic idealization of mechanics, particle, rigid body, mass, time, continuum, force, force system, system of units, principle of transmissibility of forces, principle of superposition.

COPLANAR CONCURRENT FORCE SYSTEM: Resultant of forces. Resolution of forces, Composition of coplanar concurrent, parallel and non-concurrent forces, Moment of a force, Varignon's theorem, free body diagram, equilibrant, equilibrium of particles and rigid bodies.

Self-Study Component: Application of triangle and polygon Law, vector method of resolution and Composition of forces.

UNIT – II

SUPPORT REACTIONS: Types of loads and types of supports, statically determinant beams, Numerical problems on support reactions for beams with point loads (normal and inclined), uniformly distributed load, uniformly varying load and moment.

FRICTION: Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, characteristics of dry friction, application – body on horizontal plane and inclined plane and ladder friction.

Self-Study Component: Numerical problems on support reaction of beams loaded with trapezoidal loads, Support reactions for Compound beams and wedge friction - numerical problems.

UNIT – III

CENTROID AND CENTRE OF GRAVITY: Introduction to centroid and centre of gravity, Centroid of rectangular, triangular, circle, semicircle, quarter circle lamina and sector from first principles. Numerical problems on Centroid of composite lamina.

Self-Study Component: Determining Centroid for Composite Lamina with openings.

UNIT – IV

MOMENT OF INERTIA: Introduction, radius of gyration, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, moment of inertia of standard geometrical figures by first principles. Numerical problems on moment of inertia of composite sections.

Self-Study Component: Determining moment of Inertia of Composite sections with reference to given axis.

UNIT – V

DYNAMICS: Introduction to dynamics, Classification, linear and curvilinear motion- projectiles, centripetal and centrifugal forces, banking/super elevation.

Introduction to work, power and energy, impulse – numerical problems.

Self-Study Component: Concept of motion with varying acceleration. Collision of elastic bodies.

Text Book(s):

1. S.S Bhavikatti, A text on elements of Civil Engineering and mechanics, New age International publishers, 2015.

2. R.S. Khurmi, A text book of engineering mechanics, S. CHAND & COMPANY LTD.

Reference Book(s):

1. Ramamrutham S: A text book of applied mechanics, Dhanpatrai and sons

2. S. Rajashekar, G Shankar Subramanian: Engineering Mechanics- Statics and Dynamics, Vikas Publishing House 1999.

3. Ferdinand Beer and Johnson F.R (Jr) Mechanics for Engineers, Tata Mc Graw-hill Publishing comp. Ltd New Delhi.

Handwritten signatures and dates:
A.K. 14/12/22



CH306TPC12

Process Dynamics and Control

[L:3, T:1, P:0]

Objectives

1. To provide fundamental knowledge on process control strategies.
2. To impart knowledge on a theoretical analysis of open loop and closed loop systems.

2%

Contents:

Unit-I: Process Control : Importance of process control in chemical plants and systems, Various types of Control systems viz. open loop and closed loop control, feedback and feed forward control, servo and regulator control; Importance of dynamic behaviour of processes in process control, Physical and block diagram representation of control system, Use of Laplace transformation in analysis of control systems.

Unit-II: Simple System Analysis: Laplace transformation and transfer function, Block diagrams, Linearization, First and higher order systems, Interacting and non-interacting systems, Distributed and lumped parameters systems, Dead time.

Unit-III: Linear Open Loop Systems: Response of first order, second order and higher order systems, Linearization of non-linear systems, Transportation lag. Linear Closed Loop Systems: Study of various control system and their components viz. controllers, final control elements, Measuring instruments, Closed loop transfer functions, Transient response of simple control system, Stability criterion and analysis.

Unit-IV: Root Locus, Stability Criterion and Transient Response: Transient response analysis from root locus, Application of root locus to control system, Routh stability criterion.

Unit-V: Frequency Response Analysis: Design of control system by frequency response, Closed loop response by frequency response, Frequency response technique: Phase margin and gain margin, Bode stability criterion; Nyquist stability criterion, Controller tuning: Ziegler-Nichols method, Cohen-Coon method, Introduction to advanced controllers: cascade control, feed forward control, **Introduction to artificial intelligence.**

Suggested Text Books :

1. Process Systems Analysis and Control by D.R. Coughanowr and S. LeBlanc, McGraw-Hill.
2. Process Dynamics and Control by D.E. Seborg, T.F. Edgar and D.A. Mellichamp, John Wiley.
3. Chemical Process Control: An Introduction to Theory and Practice by G. Stephanopoulos, Pearson Education.

Course Outcome:

Students would be able to

1. Evaluate dynamic behaviour of first and second order system.
2. Determine the process stability in Laplace domain.
3. Analyze open-loop systems and linear closed loop systems.
4. Develop working knowledge of control system by frequency response.
