



List of Revised Courses

Department : Chemical Engineering

Programme Name : B.Tech.

Academic Year : 2020-21

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	CH05TPC08	Heat Transfer
02.	CH05TPC09	Mass Transfer-I
03.	CH05TPE11	Engineering Materials
04.	CH05TOE11	Fluidization Engineering
05.	CH06TPC11	Mass Transfer-II
06.	CH06TPE31	Fertilizer Technology
07.	MA201TBS01	Mathematics-I
08.	MA202TBS03	Mathematics-II
09.	EC201TES01	Basic Electrical And Electronics Engineering
10.	ME201PES01	Engineering Graphics
11.	EC201PES03	Basic Electrical And Electronics Engineering Lab



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

Academic Year : 2020-21

School : School of Studies of Engineering and Technology

Department : Chemical Engineering

Date and Time : July 27, 2020 - 11:00 AM

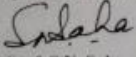
Venue : Online

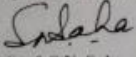
Minutes of Meeting

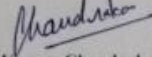
The scheduled meeting of member of Board of Studies (BoS) of Department of Chemical Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held today (July 27, 2020) in online mode (via Google Meet) to discuss the B.Tech. Third year (V and VI semesters) scheme and syllabi. The meeting was conducted in online mode due to Covid-19 pandemic and lock down. The following members were present in the meeting:

1. Prof. (Mrs.) A.B. Soni (External Expert Member BoS, Dept. of Chemical Engg., NIT Raipur)
2. Prof. S.N. Saha (Member BoS, Dept. of Chemical Engg.)
3. Dr. Anil Kumar Chandrakar (HoD (I/c), Associate Prof., Dept. of Chemical Engg.-cum-Chairman, BoS)
4. Mrs. Anuradha Nanewar Joshi (Member BoS, Assistant Professor, Dept. of Chemical Engg.)
5. Dr. Sagar Kumar Jaiswal (Invited Member, HoD (I/c), Dept. of Law)
6. Mr. Neeraj Chandraker (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
7. Mr. Amit Jain (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
8. Mr. G.P. Dewangan (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
9. Dr. Raghwendra Singh Thakur (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
10. Mr. Vishnu Prasad Yadav (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
11. Mr. Saurabh Meshram (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
12. Dr. Sandeep Dharmadhikari (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
13. Dr. Ghoshna Jyoti (Invited Member, Assistant Professor, Dept. of Chemical Engg.)


The committee discussed and approved the scheme and syllabi of B.Tech. Third year (V and VI Semesters). As per decision amongst members present in the meeting, this scheme and syllabus is being sent to external BoS members for their review and formal consent. Because of the pre occupancy of External Industry Expert Member, Mr. Suprangya Mohanty (Deputy Manager, HINDALCO, Mahan Unit, Bargawan, Singrauli) could not attend the online meeting. However, he has given the consent on the scheme and syllabi sent to him through mail.



Prof. (Mrs.) A.B. Soni
External Expert Member, BoS
Professor, Chemical Engg.,
NIT, Raipur



Prof. S.N. Saha
Member, BoS
Professor, Chemical Engg.

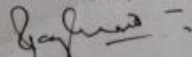

Dr. Anil Kumar Chandrakar
Chairman, BoS
HOD (I/c), Chemical Engg.

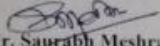

Mrs. A.N. Joshi
Member, BoS
Assistant Prof., Chemical Engg.

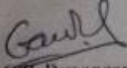

Dr. Sagar Kumar Jaiswal
Invited Member
HoD(I/c), Dept. of Law

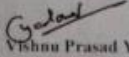

Mr. Neeraj Chandraker
Invited Member
Assistant Prof., Chemical Engg.


Mr. Amit Jain
Invited Member
Assistant Prof., Chemical Engg.



Dr. Raghwendra Singh Thakur
Invited Member
Assistant Prof., Chemical Engg.


Mr. Saurabh Meshram
Invited Member
Assistant Prof., Chemical Engg.


Mr. G.P. Dewangan
Invited Member
Assistant Prof., Chemical Engg.


Mr. Vishnu Prasad Yadav
Invited Member
Assistant Prof., Chemical Engg.


Dr. Sandeep Dharmadhikari
Invited Member
Assistant Prof., Chemical Engg.


Dr. Ghoshna Jyoti
Invited Member
Assistant Prof., Chemical Engg.



The following courses were revised in the of B. Tech. Third year (V and VI Semesters) First Year:

- ❖ Heat Transfer (CH05TPC08)
- ❖ Mass Transfer-I (CH05TPC09)
- ❖ Engineering Materials (CH05TPE11)
- ❖ Fluidization Engineering (CH05TOE11)
- ❖ Mass Transfer-II (CH06TPC11)
- ❖ Fertilizer Technology (CH06TPE31)

The following new courses were introduced in the of B. Tech. Third year (V and VI Semesters) and First Year:

- ❖ Constitution of India-Basic Features and Fundamental Principles (CH05TMC02)

विभागाध्यक्ष, रासायनिक अभियांत्रिकी
HoD, Chemical Engineering
प्रौद्योगिकी संस्थान/Institute of Technology
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD



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

Academic Year : 2020-21

School : School of Studies of Engineering and Technology

Department : Chemical Engineering

Date and Time : December 29, 2020 - 11:00 AM

Venue : Online

Minutes of Meeting

The scheduled meeting of member of Board of Studies (BOS) of Department of Chemical Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held today (December 29, 2020) in online mode (via Google Meet) to discuss the B.Tech. First year (I and II semesters) scheme and syllabi for CBCS-New pattern. This scheme and syllabi will be applicable for the students of the batch admitted in session 2020-21. The meeting was conducted in online mode due to Covid-19 pandemic situation. The following members were present in the meeting:

1. Prof. (Mrs.) A. B. Soni (External Expert Member BoS, Dept. of Chemical Engg., NIT Raipur)
2. Mr. Suprangya Mohanty (External Industry Expert Member BoS, Deputy Manager, HINDALCO, Mahan Unit, Bargawan, Singrauli)
3. Prof. S. N. Saha (Member BoS, Dept. of Chemical Engg.)
4. Dr. Anil Kumar Chandrakar (HOD, (I/e), Associate Prof., Dept. of Chemical Engg.-cum-Chairman, BOS)
5. Mrs. A. N. Joshi (Member BoS, Assistant Professor, Dept. of Chemical Engg.)
6. Mr. Amit Jain (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
7. Mr. G. P. Dewangan (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
8. Dr. Raghendra Singh Thakur (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
9. Mr. Vishnu Prasad Yadav (Invited Member, Assistant Professor, Dept. of Chemical Engg.)
10. Dr. Sandeep Dharmadhikari (Invited Member, Assistant Professor, Dept. of Chemical Engg.)

The committee discussed and approved the scheme and syllabi of B.Tech. First year (I and II Semesters). As per decision between members present in the meeting, this scheme and syllabus is being sent to external BOS members for their review and formal consent.

A.Soni
Prof. (Mrs.) A. B. Soni
External Expert Member, BoS
Professor, Chemical Engg.
NIT, Raipur

Suprangya Mohanty
Mr. Suprangya Mohanty
External Industry Expert Member, BoS
Deputy Manager, HINDALCO
Mahan Unit, Bargawan, Singrauli

Saha
Prof. S. N. Saha
Member, BoS
Professor, Chemical Engg.

Chandrakar
Dr. Anil Kumar Chandrakar
Chairman, BOS
HOD (I/e), Chemical Engg.

Joshi
Mrs. A. N. Joshi
Member, BOS
Assistant Prof., Chemical Engg.

Amit Jain
Mr. Amit Jain
Invited Member
Assistant Prof., Chemical Engg.

Raghendra Singh Thakur
Dr. Raghendra Singh Thakur
Invited Member
Assistant Prof., Chemical Engg.

G.P. Dewangan
Mr. G. P. Dewangan
Invited Member
Assistant Prof., Chemical Engg.

Vishnu Prasad Yadav
Mr. Vishnu Prasad Yadav
Invited Member
Assistant Prof., Chemical Engg.

Sandeep Dharmadhikari
Dr. Sandeep Dharmadhikari
Invited Member
Assistant Prof., Chemical Engg.



The following courses were revised in the of B. Tech. First year (I and II semester):

- ❖ Mathematics-I (MA201TBS01)
- ❖ Mathematics-II (MA202TBS03)
- ❖ Basic Electrical And Electronics Engineering (EC201TES01)
- ❖ Engineering Graphics (ME201PES01)
- ❖ Basic Electrical And Electronics Engineering Lab (EC201PES03)

The following new courses were introduced in the of B. Tech. First year (I and II semester):

- ❖ Engineering Mechanics (CE201TES01)
- ❖ Engineering Mechanics Lab (CE201PES01)
- ❖ Basic Civil & Mechanical Engineering (CM201TES03)
- ❖ Indian Constitution (LW201TMC01)
- ❖ Introduction To Information Technology (IT202TES05)
- ❖ English Communication (EN202THS01)

विभागाध्यक्ष, रासायनिक अभियांत्रिकी
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Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Signature & Seal of HoD



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)

DEPARTMENT OF CHEMICAL ENGINEERING

List of Professional Elective Courses (Fifth and Sixth semester)

S.No.	Semester	Course No.	Subjects
01.	V	CH05TPE11	Engineering Materials
02.		CH05TPE12	Organic Chemical Technology
03.		CH05TPE13	Polymer Technology
04.	VI	CH06TPE21	Environmental Engineering
05.		CH06TPE22	Fundamental of Biochemical Engineering
06.		CH06TPE31	Fertilizer Technology
07.		CH06TPE32	Fuel Combustion Energy Technology

List of Open Elective Courses (Fifth and Sixth semester)

S.No.	Semester	Course No.	Subjects
01.	V	CH05TOE11	Fluidization Engineering
02.		CH05TOE12	Financial Management
03.		CH05TOE13	Managerial Economics
04.	VI	CH05TOE14	Financial Accounting and Costing
05.		CH06TOE21	Process Utilities and Safety
06.		CH06TOE22	Enterprise Resource Planning
07.		CH06TOE23	Management Information System
08.		CH06TOE24	Six Sigma and DOE

S. Saha
27/7/2020

Shrestha
27/07/2020

Mishra
27/07/2020

Chandel
27/07/2020

Mandhokar
27/07/2020

De
27.07.2020

S
27/07/2020

Jain
606
27/07/2020



B.Tech. Syllabus (AICTE)

Department of Chemical Engineering

CH05TPE11 Engineering Materials [L:3, T:0, P:0]

Objectives

1. To provide the understanding of material selections for construction to execute a task for a particular application, its properties and behaviour at different circumstances.
2. Properties, behaviour and maintenance of various engineering materials.

Contents:

3% Change

Unit-I: Crystalline and Non-Crystalline Materials: Crystalline state, Atomic bonding, Bravais lattices, Miller indices, Structure of some common inorganic compounds, Structural imperfections. Economic, environmental and social issues of material usage.

Unit-II: Mechanical properties of materials and their variation with temperature, importance and limitations of these properties on material selection for a particular application, Failure of materials; Failure of materials under service conditions.

Unit-III: Corrosion: Mechanism of corrosion, **Types of corrosion**, Factors influencing corrosion, Methods of corrosion control, Inhibition and other precautionary measures.

Unit-IV: Non-Ferrous Metals: Copper, Brasses, Bronze, Aluminium, their mechanical properties, Workability and applications, Corrosion resistance, Non-metallic materials of construction.

Unit-V: Phase diagram: Phase rules, Equilibrium phase diagram, cooling curves and their relations to properties of metals and alloys, Iron-carbon equilibrium diagram. Response of materials to chemical environment.

Suggested Text Books :

1. Introduction to Materials Science for Engineers by James F. Shackelford, Pearson.
2. Elements of Materials Science and Engineering by L.H. Van Vlack, Pearson.
3. Materials Science and Engineering by V. Raghavan, PHI Learning Private Limited.
4. Materials Science for Engineers by L. H. VanVlack, Addison-Wesley Publishing Co.
5. Chemistry of Engineering Materials by A. M. Sikkander and T. N. Balu, Raj Publications.
6. Corrosion, Prevention and Control by K.S. Rajagopalan, Scientific Surveys Limited.
7. Corrosion Engineering by M. G. Fontana, McGraw Hill Education.

Reference Book:

1. Perry's Chemical Engineers' Handbook by D. W. Green and R. H. Perry, McGraw Hill Publication.

Course Outcome:

Students would be able to

1. Explain different types of materials and their mechanical properties and limitations.
2. Explain types of corrosion and various methods to control them.
3. Describe phase diagram and its significance.

Amol 27/10/2020
Sudha 27/10/2020
Chandrika 27/10/2020
Srinivas 27/10/2020
K 27/10/2020



B.Tech. Syllabus (AICTE)

Department of Chemical Engineering

CH05TOE11

Fluidization Engineering

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

Objectives

To impart the fundamental knowledge of Fluidization and understand the different aspects of fluidized bed systems applied in various industries.

Contents:

30% Change

Unit-I: Phenomenon of Fluidization, Advantages and disadvantages of fluidization compared to conventional processes, Classification of various industrial beds, Industrial applications of fluidized beds in mineral processing, coal and biomass gasification & combustion-FCC, petroleum refining, pharmaceuticals, cement and other solid handling systems, Fluidized Bed Drying.

Unit-II: Gross behavior of fluidized beds-Minimum fluidizing velocity and pressure drops; Voidage, Design of distributors, Effect of temperature and pressure on fluidized bed, Elutriation and entrainment, Transport disengaging height.

Unit-III: Bubbles in dense beds-Davidson Model, stream of bubbles, Bubbling bed models, Geldart classification, Different regimes of Fluidization, Davidson's model, Variation of Bubbling bed and Circulating Fluidized beds.

Unit-IV: Emulsion phase, Turn-over rate of solids, Residence Time Distribution of Solids, Diffusion model of solids movement, Interchange coefficient of solid into and out of wake.

Unit-V: Flow Pattern of Gas through fluidized beds, diffusion model for gas flow; two region models, evaluation of interchange coefficients, Heat and Mass transfer in Fluidized Beds.

Suggested Text Books :

1. Fluidization Engineering by D. Kunii and O. Levenspiel, Butterworth-Heinemann, Elsevier.

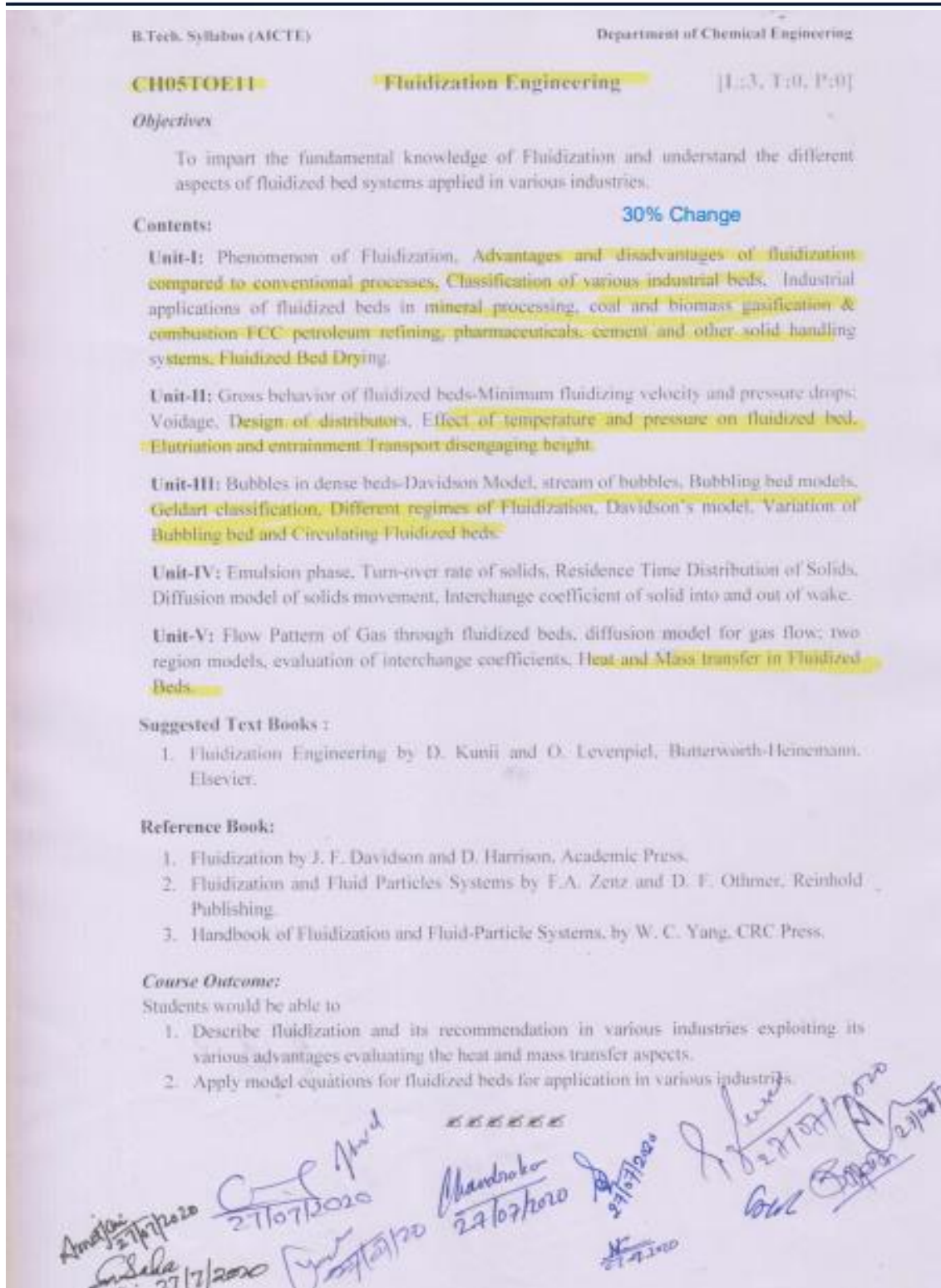
Reference Book:

1. Fluidization by J. F. Davidson and D. Harrison, Academic Press.
2. Fluidization and Fluid Particles Systems by F.A. Zenz and D. F. Othmer, Reinhold Publishing.
3. Handbook of Fluidization and Fluid-Particle Systems, by W. C. Yang, CRC Press.

Course Outcome:

Students would be able to

1. Describe fluidization and its recommendation in various industries exploiting its various advantages evaluating the heat and mass transfer aspects.
2. Apply model equations for fluidized beds for application in various industries.





B.Tech. Syllabus (AICTE)

Department of Chemical Engineering

B.Tech. VI Semester

CH06TPC11

Mass Transfer-II

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

15%

Objectives

1. To provide basic knowledge of fundamental mass transfer operations and mechanisms.
2. To understand the mass transfer in L.L.E., leaching, drying, crystallization, adsorption and humidification operation.

Contents:

Unit-I: Humidification Operations: Definitions, Humidity chart and its use in measurement of humidity and calculations of humidification operations, Adiabatic humidification, Design of Cooling Towers.

Unit-II: Leaching: Equipment, Principles of leaching, Calculation of number of ideal stages, Stage efficiency

Unit-III: Liquid-Liquid Extraction: Equipment, Principles of extraction, Panchon-Savortit method, Counter-current extraction using reflux application of McCabe method, Extraction in packed and spray column.

Unit-IV: Crystallization: Principles, yield of crystals, Super solubility curve, Crystal growth, Equipment and application of principles to design.

Adsorption: Fixed bed absorbers, break through; Ion-Exchange

Unit-V: Drying: Equipment, Principles, Mechanism and theory of drying, Calculation of drying time.

Suggested Text Books :

1. Principles of Mass Transfer and Separation Processes by B. K. Dutta, PHI Learning Private Limited.
2. Mass Transfer Operations by R. E. Treybul, McGraw Hill.
3. Diffusion - Mass Transfer in Fluid Systems by E.L. Cussler, Cambridge University Press.
4. Principles of Unit Operations by A. S. Foust, A. L. Wenzel, C. W. Clamp, L. Maus and L. B. Anderson, John Wiley & Sons.

Course Outcome:

Students would be able to

1. Explain the basics of Mass Transfer and related laws.
2. Identification of mechanisms of mass transfer, Formulation of rate equations.
3. Solve problems related to drying, leaching and crystallization.

Amojib
27/10/2020

Chandrakar
29/10/2020

Ne
27/10/2020

Sulake
27/11/2020

Coil
27/10/2020

Sharma
27/10/2020

Coil
27/10/2020

Sharma
27/10/2020

Sharma
27/10/2020



SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)

CBCS-NEW, EVALUATION SCHEME

PROPOSED (W.E.F. SESSION 2020-21)

B. TECH. FIRST YEAR (SEMESTER- I)

(Common for CH, CE, IPE, ME)

S.No.	COURSE No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	SUB-TOTAL	
THEORY									
1.	MA201TBS01	MATHEMATICS-I	3	1	-	30	70	100	4
2.	CY201TBS02	CHEMISTRY	3	1	-	30	70	100	4
3.	CE201TES01	ENGINEERING MECHANICS	3	0	-	30	70	100	4
4.	CS201TES02	COMPUTER PROGRAMMING	3	0	-	30	70	100	3
5.	CM201TES03	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	-	30	70	100	3
6.	LW201TMC01	INDIAN CONSTITUTION	0	-	-	-	-	-	-
TOTAL			17	3	-	150	350	500	18
PRACTICALS									
1.	CY201PBS01	CHEMISTRY LAB	-	-	2	30	20	50	1
2.	CE201PES01	ENGINEERING MECHANICS LAB	-	-	2	30	20	50	1
3.	CS201PES02	COMPUTER PROGRAMMING LAB	-	-	2	30	20	50	1
TOTAL			-	-	6	90	60	150	3
GRAND TOTAL			17	3	6	240	410	650	21

Total Credits:21

Total Contact Hours:26

Total Marks:650

L:LECTURE, T:TUTORIAL, P:PRACTICAL, IA : INTERNAL ASSESSMENT, ESE:END SEMESTER EXAMINATION

*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.



SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
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(A CENTRAL UNIVERSITY)

CBCS-NEW, EVALUATION SCHEME

PROPOSED (W.E.F. SESSION 2020-21)

B. TECH. FIRST YEAR (SEMESTER- II)

(Common for CH, CE, IPE, ME)

S. No.	COURSE No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	SUB-TOTAL	
THEORY									
1.	MA202TBS03	MATHEMATICS-II	3	1	-	30	70	100	4
2.	PH202TBS04	PHYSICS	3	1	-	30	70	100	4
3.	EC202TES04	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	1	-	30	70	100	4
4.	IT202TES05	INTRODUCTION TO INFORMATION TECHNOLOGIES <small>New Course</small>	2	0	-	30	70	100	2
5.	EN202THS01	ENGLISH COMMUNICATION	3	0	-	30	70	100	3
TOTAL			14	3	-	150	350	500	17
PRACTICALS									
1.	PH202PBS02	PHYSICS LAB	-	-	2	30	20	50	1
2.	ME202PES03	ENGINEERING GRAPHICS	1	-	3	30	20	50	3
3.	ME202PES04	WORKSHOP TECHNOLOGY & PRACTICES	1	-	2	30	20	50	2
4.	EC202PES05	BEE LAB	-	-	2	30	20	50	1
TOTAL			2	-	9	120	80	200	7
GRAND TOTAL			16	3	9	270	430	700	24

Total Credits:24

Total Contact Hours:28

Total Marks:700

L:LECTURE, T:TUTORIAL, P:PRACTICAL, IA : INTERNAL ASSESSMENT, ESE:END SEMESTER EXAMINATION

*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.



SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	MA201TBS01							70	100	04
Subject:	MATHEMATICS-I	3	1	-	15	15	30			

90% Change

Course Content

Calculus (Single Variable)

UNIT 1: Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Asymptotes: definition, properties and problems.

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L' Hospital's rule; Maxima and minima.

UNIT 2: Sequences and series: Convergence of sequence and series, tests for convergence, power series, and Taylor's series. Series for exponential, trigonometric and logarithmic functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT-3: (A): Multi variable Calculus (Differentiation): Limit, continuity and partial derivatives, directional Derivatives, total Derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

(B): Multivariable Calculus (Integration): Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar). Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities). Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT - 4 (A): Matrices (in case vector spaces is not to be taught): Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

(B) Matrices (in case vector spaces is to be taught): Matrices, vectors: addition and scalar multiplication, matrix multiplication; linear systems of Equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

UNIT-5 (A): Vector spaces: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

(B) Vector spaces: Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbasis. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.



B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	Periods/ Subject Code:	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject:	MA202TBS03							70	100	4
Subject:	MATHEMATICS-II	3	1	-	15	15	30			

90% Change

Course Content:

UNIT 1: First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT 2: Ordinary differential equations of higher orders (Prerequisite 2c, 4a) second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT 3: Partial Differential Equations – First order (Prerequisite 5a-b): First order partial differential equations, solutions of first order linear and non-linear PDEs.

UNIT 4: Partial Differential Equations– Higher order (Prerequisite 5b-c) Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems).

UNIT 5: D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary- value problems for various linear PDEs in various geometries.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.
7. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
8. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.
9. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.
10. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010
11. Denian murry, differential equations ,oxford publications



B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	EC201TES01 / EC202TES04							70	100	04
Subject:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	1	-	15	15	30			

Course Learning Objectives:

- To impart a basic knowledge of electrical quantities such as current, voltage, power, energy and To provide working knowledge for the analysis of basic DC circuits used in electrical and electronic devices.
- To provide working knowledge for the analysis of basic AC circuits used in electrical and electronic devices and measuring instruments
- To explain the working principle, construction, applications of Transformer, DC machines and AC machines.
- To make students understand basics of Diodes and Transistors.
- To impart knowledge about basics of Digital Electronics

80% Change

Course Content:

UNIT-1: DC circuits (8 hours)

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. Time-domain analysis of first-order RL and RC circuits. Mesh & nodal analysis, Star-Delta transformation and circuits.

UNIT-2: AC circuits (8 hours)

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. Construction and working principle of single-phase wattmeter and energy meter. Introduction to Sensors and Transducers.

UNIT-3: Electrical machines (8 hours)

Construction, classification, ideal and practical transformer, equivalent circuit, losses in transformers, tests, voltage regulation and efficiency. Construction, Working Principle, losses and efficiency of DC Machines and three phase Induction Machine, DC motor.

UNIT-4: Semiconductor devices And application (8 hours)

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT 5: Digital Electronics (8 hours)

Binary Number System, Logic Gates, Combinational circuits, Boolean Algebra, De Morgan's Theorem, Half and Full Adders, Flip-Flops. Sequential circuits-Registers and Counters, A/D and D/A Conversion.

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 and AK Theraja, "A Textbook of Electrical Technology- Vol-I & II, S. CHAND & 2013.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics - Anal Digital Circuit and Systems", 2nd Edition 2017
- Robert L Boylestad, Louis Nashlky, "Electronics devices and circuit theory", Pearson 11th 2013
- M. Morris Mano, "Digital Logic and Computer Design", Pearson, 2004.



B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	ME201PES01/ ME202PES03									
Subject:	ENGINEERING GRAPHICS	1	0	3	30	--	30	20	50	3

Course Learning Objectives:

30% Change

- To learn the basic of Engineering Drawing and Orthographic Projections
- To learn the Sections and Sectional Views of Right Angular Solids
- To learn the Isometric Projections covering and overview of Computer Graphics

UNIT 1: Introduction Engineering Graphics and Engineering Curves: Principles of engineering graphics and their significance – drawing instruments and their use – conventions in drawing – lettering – BIS conventions. Dimensioning rules, geometrical construction. Engineering Curves - Conic Sections, Special Curves-Cycloids, Epicycloids, Hypocycloids, Involutives and trochoid.

UNIT 2: Projection of Points, Straight lines and Planes: Principles of orthographic projections – conventions – first and third angle projections. Projections of points and lines inclined to both the planes. Projections of regular planes, inclined to both planes

UNIT 3: Projections Solids: Introduction, Type of solid, Projections of solids in simple position, Projection of solids with axes inclined to one of the reference planes and parallel to the other, Projections of solids with axes inclined to both H.P. and the V.P.

UNIT 4: Section of Solids and Development of Surfaces: Sectioning of regular solids - Section planes perpendicular to one plane and parallel or inclined to other plane - Development of surfaces of right, regular solids – development of prisms, cylinders, pyramids, cones and their parts.

UNIT 5: Isometric Projections and Orthographic Views: Principles of Isometric Projections-Isometric Scale- Isometric Views Conventions-Plane Figures, Simple and Compound Solids. Conversion of isometric views to orthographic views. Conversion of orthographic views to isometric projections, vice-versa. Introduction to perspective projection.

Computer Aided Drafting: Introduction to computer aided drafting package to make 2-D drawings. Demonstration purpose only - not to be included in examinations.

Textbooks/References:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. CAD Software Theory and User Manuals

Course Outcomes:

1. At the end of the course, the student shall be able to
2. Draw engineering curves, orthographic projections of lines, planes and solids.
3. Draw sections of solids including cylinders, cones, prisms and pyramids.
4. Make development of surfaces, Orthographic and Isometric projections
5. Overview of Computer Graphics.



B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS Subject Code:	(SEMESTER-II)	Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
se Subject: L	EC201PES03/ EC202PES05 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	-	-	2	30	--	30	20	50	1

Course Learning Objectives:

- To understand basic electrical wiring, measurements, errors and method. **40% Change**
- To practically provide the concept of different theorems.
- To have actually hands-on on machines like transformers, DC and AC machines to get better understanding.
- To get experimental knowledge of Diodes and Transistors
- To make students learn Digital logic design.

Course Content:

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
- Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and Verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Polarity test, OC & SC tests. Loading of a transformer: measurement of primary and secondary voltages and currents and power.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), and single-phase induction machine.
- Study of Diodes and transistors characteristics.
- Study of full-wave and half-wave rectifier.
- Verification of De Morgan's theorems.
- Study of Logic gates.
- Study of half and full adder.

Course Outcomes: At the end of the course students will be able to:

- Acquire knowledge about different types of meters and take readings and Construct circuits and measure different electrical quantities.
- Analyze Single Phase and Three phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
- Work on machines like transformers
- Acquire knowledge about different types of diodes and transistors
- Design and understand digital logic circuits