List of New Course(s) Introduced

Department : Chemical Engineering

Programme Name : B.Tech.

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	CHUFTK6	Waste to Energy
02.	CHUFTK7	Optimization Techniques in Chemical Engineering
03.	CHUETK5	Polymer Technology-I
04.	CHUFTK2	Polymer Technology-II

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

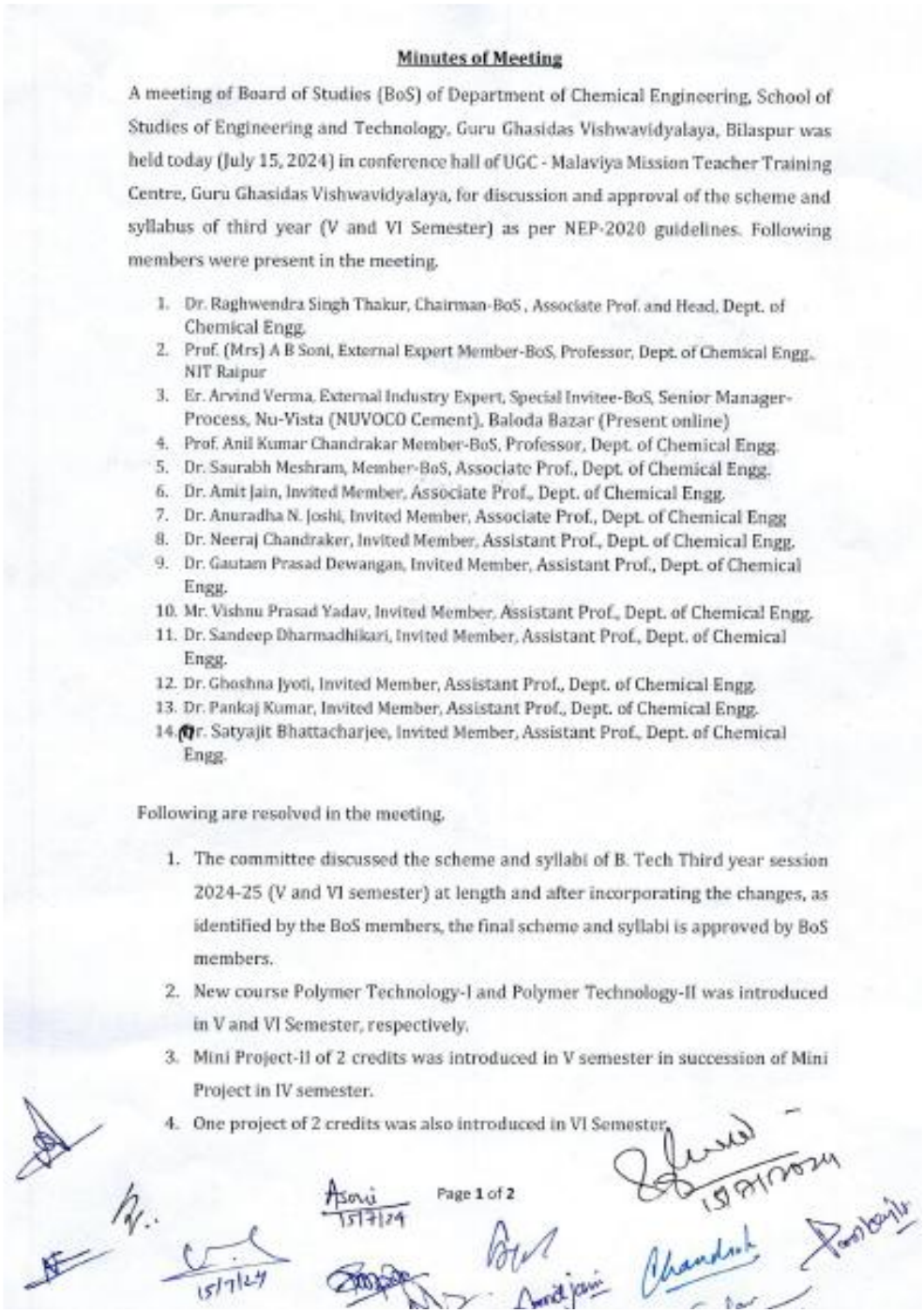
Academic Year : 2024-25

School : Engineering and Technology

Department : Chemical Engineering

Date and Time : July 15 2024; 11:00 AM

Venue : Head Room



Minutes of Meeting

A meeting 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 15, 2024) in conference hall of UGC - Malaviya Mission Teacher Training Centre, Guru Ghasidas Vishwavidyalaya, for discussion and approval of the scheme and syllabus of third year (V and VI Semester) as per NEP-2020 guidelines. Following members were present in the meeting.

1. Dr. Raghwendra Singh Thakur, Chairman-BoS , Associate Prof. and Head, Dept. of Chemical Engg.
2. Prof. (Mrs) A B Soni, External Expert Member-BoS, Professor, Dept. of Chemical Engg., NIT Raipur
3. Er. Arvind Verma, External Industry Expert, Special Invitee-BoS, Senior Manager-Process, Nu-Vista (NUVOCO Cement), Baloda Bazar (Present online)
4. Prof. Anil Kumar Chandrakar Member-BoS, Professor, Dept. of Chemical Engg.
5. Dr. Saurabh Meshram, Member-BoS, Associate Prof., Dept. of Chemical Engg.
6. Dr. Amit Jain, Invited Member, Associate Prof., Dept. of Chemical Engg.
7. Dr. Anuradha N. Joshi, Invited Member, Associate Prof., Dept. of Chemical Engg
8. Dr. Neeraj Chandraker, Invited Member, Assistant Prof., Dept. of Chemical Engg.
9. Dr. 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.
13. Dr. Pankaj Kumar, Invited Member, Assistant Prof., Dept. of Chemical Engg.
14. Dr. Satyajit Bhattacharjee, Invited Member, Assistant Prof., Dept. of Chemical Engg.

Following are resolved in the meeting.

1. The committee discussed the scheme and syllabi of B. Tech Third year session 2024-25 (V and VI semester) at length and after incorporating the changes, as identified by the BoS members, the final scheme and syllabi is approved by BoS members.
2. New course Polymer Technology-I and Polymer Technology-II was introduced in V and VI Semester, respectively.
3. Mini Project-II of 2 credits was introduced in V semester in succession of Mini Project in IV semester.
4. One project of 2 credits was also introduced in VI Semester.

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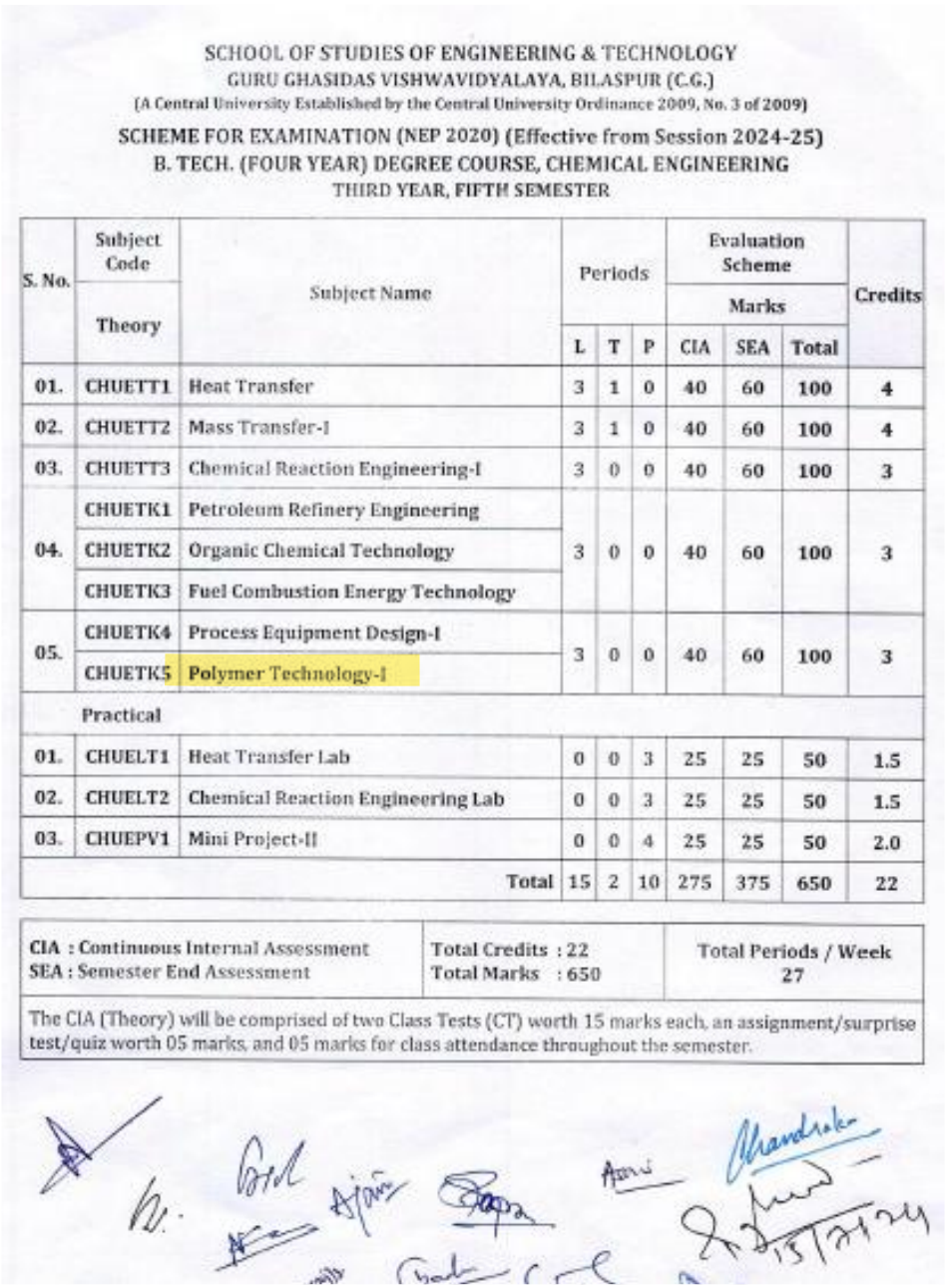
Scheme and Syllabus

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 (NEP 2020) (Effective from Session 2024-25)
B. TECH. (FOUR YEAR) DEGREE COURSE, CHEMICAL ENGINEERING
THIRD YEAR, FIFTH SEMESTER

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme			Credits
	Theory					Marks			
			L	T	P	CIA	SEA	Total	
01.	CHUETT1	Heat Transfer	3	1	0	40	60	100	4
02.	CHUETT2	Mass Transfer-I	3	1	0	40	60	100	4
03.	CHUETT3	Chemical Reaction Engineering-I	3	0	0	40	60	100	3
04.	CHUETK1	Petroleum Refinery Engineering	3	0	0	40	60	100	3
	CHUETK2	Organic Chemical Technology							
	CHUETK3	Fuel Combustion Energy Technology							
05.	CHUETK4	Process Equipment Design-I	3	0	0	40	60	100	3
	CHUETK5	Polymer Technology-I							
	Practical								
01.	CHUELT1	Heat Transfer Lab	0	0	3	25	25	50	1.5
02.	CHUELT2	Chemical Reaction Engineering Lab	0	0	3	25	25	50	1.5
03.	CHUEPV1	Mini Project-II	0	0	4	25	25	50	2.0
		Total	15	2	10	275	375	650	22

CIA : Continuous Internal Assessment SEA : Semester End Assessment	Total Credits : 22 Total Marks : 650	Total Periods / Week 27
The CIA (Theory) will be comprised of two Class Tests (CT) worth 15 marks each, an assignment/surprise test/quiz worth 05 marks, and 05 marks for class attendance throughout the semester.		



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SCHEME FOR EXAMINATION (NEP 2020) (Effective from Session 2024-25)
B. TECH. (FOUR YEAR) DEGREE COURSE, CHEMICAL ENGINEERING
THIRD YEAR, SIXTH SEMESTER

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme (Marks)			Credits
	Theory		L	T	P	CIA	SEA	Total	
01.	CHUFTT1	Mass Transfer-II	3	0	0	40	60	100	3
02.	CHUFTT2	Chemical Reaction Engineering-II	3	0	0	40	60	100	3
03.	CHUFTT3	Process Dynamics and Control	3	1	0	40	60	100	4
04.	CHUFTK1	Process Equipment Design-II	3	0	0	40	60	100	3
	CHUFTK2	Polymer Technology-II							
	CHUFTK3	Project Engineering Economics and Management							
	CHUFTK4	MOOCS-I	-	-	-	-	-		
05.	CHUFTK5	Petrochemical Technology	3	0	0	40	60	100	3
	CHUFTK6	Waste To Energy							
	CHUFTK7	Optimization Techniques in Chemical Engineering							
	CHUFTK8	MOOCS-II	-	-	-	-	-		
06.	CHUFTO1	MOOCS-III	-	-	-	-	-	100	3
	Practical								
01.	CHUFLT1	Mass Transfer Lab	0	0	3	25	25	50	1.5
02.	CHUFLT2	Process Dynamics and Control Lab	0	0	3	25	25	50	1.5
03.	CHUFPV1	Project	0	0	6	25	25	50	2.0
		Total	15	1	12	275	375	650	24

CIA : Continuous Internal Assessment SEA : Semester End Assessment	Total Credits : 24 Total Marks : 650	Total Periods / Week 28

The CIA (Theory) will be comprised of two Class Tests (CT) worth 15 marks each, an assignment/surprise test/quiz worth 05 marks, and 05 marks for class attendance throughout the semester.

New Course

B. Tech. VI Semester

CHUFTK6 **Waste to Energy** **[L:3, T:0]**

Objective

Students will learn the types of waste, its characterization techniques, and conversion process from waste to energy.

Contents

Unit I : Introduction to energy from waste, Characterization and classification of wastes, Availability of agro based, forest, industrial, municipal solid waste in India vis-a-vis world.

Unit II : Proximate & ultimate analyses waste, Heating value determination of solid liquid and gaseous fuels, and Combustion calculations.

Unit III : Incineration, Pyrolysis, Gasification, Hydrogen production, Storage and utilization, Anaerobic digestion, Composting, Gas generation and collection in landfills.

Unit IV : Industrial liquid effluents and their energy potential, Anaerobic reactor configuration for fuel gas production, Separation of methane and compression.
Biodiesel: Biodiesel production from waste/discarded oils, Characterization of biodiesel.

Unit V : Densification of agro and forest wastes, technological options, combustion characteristics of densified fuels, usage in boilers, brick kilns and lime kilns.

Text Books

1. Biomass Conversion and Technology by C. Y. WereKo-Brobby and E. B. Hagan; John Wiley & Sons.
2. Food, Feed and Fuel from Biomass by D. S. Chahal; IBH Publishing Company.

Reference Books

1. Nonconventional Energy by A. V. Desai; New Age Publishers.
2. Biogas Technology - A Practical Hand Book by K. C. Khandelwal and S. S. Mahdi; Tata McGraw-Hill Publishing Co.

Course Outcome

Students would be able to

1. Classify the waste for fuel and identify the devices for conversion of waste to energy.
2. Characterize the waste.
3. Implement the Pyrolysis and gasification techniques for waste.
4. Apply bio-chemical conversion process.
5. Produced densified fuel for combustion.

CO-PO Mapping

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

Weightage : 1-Weak, 2-Moderate, 3-Strong

New Course

B. Tech. VI Semester

CHUFTK7 Optimization Techniques in Chemical Engineering [L:3, T:0]

Objective

To make the student understand the fundamentals of optimization methods, formulate the optimization problem with and without constraint, identify and apply the optimization techniques and software tools for solving optimization problems.

Contents

Unit I : Introduction : Introduction to systems analysis and modelling, Formulation of various process optimization problems and their classification, Basic concepts of optimization-convex and concave functions, Necessary and sufficient conditions for stationary points, Differential method for solving one and two variable problems with and without constraints, Lagrangian multiplier method, Karush-Kuhn-Tucker (KKT) conditions.

Unit II : Linear Programming : Formulation of linear programming problem, Graphical method, Single phase simplex method, Two phase simplex method, Duality, Solution of linear programming problem using MS Excel.

Unit III : Optimization of One-Dimensional Functions : Sequential search methods - Golden section method, Dichotomous search method, Interval halving method, Fibonacci method; Newton-Raphson method, Quasi-newton's method, Secant method, Root finding using optimization techniques.

Unit IV : Geometric Programming : Posynomial function, Optimization problem with degree of difficulty equal to zero and one, with and without constraints.

Unit V : Non-Traditional Optimization Problem and Software Tools : Introduction to dynamic programming as applied to discrete multistage problems.
Non-Traditional Optimization Techniques : Genetic algorithm, Simulated annealing, MS Excel software for solving linear and non-linear optimization problems with and without constraints, MATLAB for optimization.

Text Books

1. Engineering Optimization : Theory and Practice by S. S. Rao; John Wiley & Sons.
2. Problems in Operations Research : Principles and Solutions by P. P. Gupta and D. S. Hira; S. Chand and Company Ltd.
3. Optimization of Chemical Processes by T. F. Edgar, D. M. Himmelblau and L. S. Lasdon; McGraw-Hill Publishing Company.

Reference Books

1. Optimization for Engineering Design by K. Deb; PHI Learning Pvt. Ltd.
2. Engineering Optimization : Methods and Applications by A. Ravindran, K. M. Ragsdell and G. V. Reklaitis; John Wiley & Sons.

CHUFTK2 **Polymer Technology - II** **[L:3, T:0]**

Objective

To comprehend the viscoelasticity of polymer materials and understand the different polymer types along with basic manufacturing steps of a polymer and a brief introduction to naturally occurring polymers.

Contents

Unit I : Viscoelasticity, mechanical models of viscoelastic behaviour, viscoelastic properties of polymer solutions and melts, rubber elasticity.

Unit II : Additives, plasticizers, Fillers and reinforcements, polymer blends, block co-polymers, polymer composites.

Unit III : Engineering thermoplastics, Polyolefins, Vinyl polymers, Polyamides, Polysulphone, Polycarbonates, Fluoropolymers, epoxies.

Unit IV : Polymer Processing & its Manufacturing: Basic processing operations, Extrusion, Modeling, Calendering, Coating, Injection moulding, Compression moulding, Transfer moulding, Blow moulding, Die casting, Rotation casting, Film casting.

Unit V : Naturally occurring polymers and biopolymers, cellulose and its derivatives, non-cellulosic.

Text Books

1. Polymer Science & Technology by J. R. Fried; PHI Learning Pvt. Ltd.
2. Outlines of Polymer Technology : Manufacture of Polymers by R. Sinha; PHI Learning Pvt. Ltd.

Reference Books

1. Polymer Science by V. R. Gowariker, N. V. Viswanathan and J. Sreedhar; New age International Publishers.

Course Outcome

Students would be able to

1. Comprehend viscoelasticity in polymer and analyse related problems.
2. Acquire knowledge of additives, plasticizers and such polymer related products and apply the same for addressing societal responsibilities.
3. Develop a detailed understanding of different industrial polymers while accessing safety and environment sustainability.
4. Develop an understanding towards the production line for polymer and be able to communicate the engineering community via proper reports, presentations on the manufacturing process.
5. Acknowledge about knowledge on biopolymers and be able to apply the same on societal concerns and sustainability.

CHUETK5 **Polymer Technology - I** **[L:3, T:0]**

Objective

Identification, characterization and synthesis techniques of different polymer along with understanding their thermodynamics, thermal transitions and environmental effects.

Contents

Unit I : Introduction, Classification of polymer, Polymer structure, Molecular weight distribution, Molecular weight averages of polymer.

Unit II : Synthesis of polymers, Polymerization techniques, Polymer reactivity, Preparation of polymer derivatives.

Unit III : Thermodynamics of polymer solution, Flory Huggins theory, Modified Flory Huggins theory, Molecular weight measurement.

Unit IV : Amorphous state, Glass transition temperature, Crystalline state, Crystalline melting temperature, Thermal transitions and related property change.

Unit V : Effect of polymer on environment, Polymer degradation and stability.

Text Books

1. Polymer Science & Technology by J. R. Fried; PHI Learning Pvt. Ltd.
2. Outlines of Polymer Technology : Manufacture of Polymers by R. Sinha; PHI Learning Pvt. Ltd.

Reference Books

1. Polymer Science by V.R. Gowariker, New age International Ltd.

Course Outcome

Students would be able to

1. Characterize different polymer types and be aware of the need for polymers in broader areas of life.
2. Understand different polymer synthesis techniques and related health and cultural issues while maintaining engineering ethics and responsibilities.
3. Acquire knowledge about thermodynamic principles of polymers and be able to communicate through presentations on specific problems related to engineering community.
4. Develop understanding of the involved thermal transitions in polymers while maintaining engineering ethics and responsibility.
5. Acknowledge about environmental concerns related to polymers, their sustainability and ethical issues.