List of New Course(s) Introduced

Department : Industrial and Production Engineering

Programme Name : B.Tech

Academic Year : 2024-25

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	IPUCTT4	Material Science and Metallurgy
02.	IPUDTT4	Engineering Mathematics-C
03.	IPUDTP2	Safety Management and Labour Law

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

Academic Year : 2024-25

School : *School of Studies of Engineering and Technology*

Department : *Industrial and Production Engineering*

Date and Time : *Jun. 28, 2024 – 11:00 noon*

Venue : *Meeting room*

The scheduled meeting of member of Board of Studies (BoS) of Department of Industrial and Production Engineering, School of Studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the contents of syllabus

The following members were present in the meeting:

1. Prof. S.C. Shrivastava (HOD, Professor., Dept. of I.P.E., -cum Chairman, BOS)
2. Prof. M.K. Singh (Member BoS, Professor, Dept. of I.P.E)
3. Mr. C.P. Dewangan, (Member BoS, Associate Prof., Dept. of I.P.E)
4. Mr. Nitin Kumar Sahu, (Member BoS, Assistant Prof., Dept. of I.P.E)
5. Dr. S. C. Gajbhiye (Invited Member BoS, Associate Prof., Dept. of I.P.E)
6. Dr. Manish Oraon (Invited Member BoS, Associate Prof., Dept. of I.P.E)
7. Mrs. A. R. Choudhary (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
8. Dr. Atul Kumar Sahu (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
9. Dr. Ganesh Prasad Shukla (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
10. Mrs. Disha Dewangan (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
11. Mr. Kailash Kumar Borkar (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
12. Mr. Anurag Singh (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
13. Mr. Kawal Lal Kurrey (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
14. Mr. Somnath Singroul (Invited Member BoS, Assistant Prof., Dept. of I.P.E)
15. Prof. A. K. Thakur (Invited Member BoS, Professor, Dept. of Mathematics)
16. Mr. C. P Dhuri (Invited Member BoS, Assistant Prof., Dept. of Mathematics)

Following External members has also participated in formulating the coding, scheme and syllabus of B. Tech. III to VII Semester by email.

1. Dr. A. R. Dixit (External Expert, Professor, Mechanical Engineering Department, Indian Institute of Technology ISM, Dhanbad)
2. Mr. Bhanja Prasad Patro (External Expert, Director & Head, CIPET: CSTS - Bhubaneswar)

Following points were discussed during the meeting

1. The syllabus, scheme and coding of B. Tech. III –VIII Semester (Industrial & Production Engineering) is shared with the external experts. Moreover, several

conversations held from the external experts by the Head of the Department and Departmental BOS Coordinator and their suggestion and comments are considered in the same.

2. In the meeting, syllabus, scheme and coding of B. Tech. III –VIII Semester (Industrial & Production Engineering) was discussed in detail and incorporated. The verbal suggestions received from the external experts in the meeting are also incorporated and recommended for approval. After incorporation of all the suggestions, the final updated syllabus will be sent for their reference.
3. It is also decided that the subject code may be changed (if any, in future) as per university norms/ regulations/ ordinance/ policies from time to time.
4. Also, the open elective (name and subject code/ syllabus) may be changed in future as per the directions of the offering department in the scheme/ syllabus.
5. The syllabus, scheme and coding of B. Tech. III –VIII Semester of Department of Industrial & Production Engineering has been accepted by the B.O.S. (I.P.E.) and attached herewith for approval from the competent authority.

The committee discussed and approved the scheme and syllabi. The following courses were introduced

- IPUCTT4 Material Science and Metallurgy
- IPUDTT4 Engineering Mathematics-C
- IPUDTP2 Safety Management and Labour Law

Signature & Seal of HoD

Scheme and Syllabus

GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR, CG
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
Department of Industrial & Production Engineering
NEP 2020–Scheme of Teaching & Examination
W.E.F. Session: 2024-2025
B. TECH SECOND YEAR, III SEMESTER

SN	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme			Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment	Semester Examination Assessment	Total Marks	
			L	T	P	CIA	SEA		
1	IPUCTT4	Material Science and Metallurgy	3	–	–	40	60	100	3
2	IPUCTT5	Mechanics of Materials	3	–	–	40	60	100	3
3	IPUCTT6	Engineering Thermodynamics	3	–	–	40	60	100	3
4	IPUCTT7	Theory of Machines	3	–	–	40	60	100	3
5	IPUCTP_	*Professional Elective-1/2*	3	–	–	40	60	100	3
6	_UCTO_	*Open Elective*	3	–	–	40	60	100	3
Total			**18**	–	–	**240**	**360**	**600**	**18**
PRACTICALS									
1	IPUCLT2	Mechanics of Materials Lab	–	–	2	25	25	50	1
2	IPUCLT3	Theory of Machines Lab	–	–	2	25	25	50	1
Total			**–**	**–**	**4**	**50**	**50**	**100**	**2**
GRAND TOTAL			**18**	**-**	**4**	**290**	**410**	**700**	**20**

List of Department/ Professional Elective		
SN	Course No.	Subject
1.	IPUCTP1	Business Communication and Professional Skills
2.	IPUCTP2	Effective Technical Communication

Institute Core/ Open Elective offered by the Department			
SN	Course No.	Subject	Offering Department
1.	IPUCTO2	Introduction to Industrial Engineering	IPE

Internal Assessment: – Two class tests of 15 marks each will be conducted. Moreover, 5 marks will be for attendance and 5 marks are allocated for the Assignments, surprise test, quiz test etc.

Approved in BOS meeting held on 28.06.2024

Semester	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme						Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment				Semester Examination Assessment	Total Marks	
						CIA						
			L	T	P	CT–1	CT–2	Assignment, surprise test, quiz test etc	Attendance	SEA		
B. Tech III Sem	IPUCTT4	Material Science and Metallurgy	3	-	-	15	15	5	5	60	100	3

COURSE LEARNING OBJECTIVES:

The objective of this course is to:

1. To provide knowledge of different material crystal structures, arrangement of atoms and mechanical properties.
2. To know different solid solutions and phase diagrams.
3. To draw TTT curves and Iron carbon diagrams.
4. To select various engineering materials based on composition and properties for a given application.
5. To introduced various material testing methods related to its mechanical and functional properties.

COURSE CONTENT:

Module-I

Crystal Structure: BCC, FCC and HCP Structures, coordination number and atomic packing factors, crystal imperfections –point, line and surface imperfections. Atomic Diffusion: Phenomenon, Flick's laws of diffusion, factors affecting diffusion.

Mechanical Behavior: Stress-strain diagram for ductile and brittle materials, True stress and true strain, linear and non linear elastic behavior and properties, mechanical properties in plastic range, yield strength, offset yield strength, ductility, ultimate tensile strength, and toughness. Plastic deformation of single crystal by slip and twinning.

Module-II

Solidification and Solid Solutions: Mechanism of solidification, Homogenous and Heterogeneous nucleation, crystal growth, cast metal structures, solid solutions- types and rules governing the formation of solid solutions.

Phase Diagram: Basic terms, phase rule, lever rule, cooling curves, construction and interpretation of different phase diagrams (eutectic, eutectoid, peritectic and peritectoid)

Module-III

Heat Treatment of Metals: TTT curves, continuous cooling curves, annealing and its types. normalizing, hardening, tempering, martempering, austempering, hardenability, surface hardening methods like carburizing, cyaniding, nitriding, flame hardening and induction hardening, age hardening of Aluminium-copper alloys.

Approved in BOS meeting held on 28.06.2024

Module-IV

Types and application of common engineering materials: Metals, Alloys, Semiconductors, Ceramics, Polymers and Composites (metal, polymer and ceramic based).
Ferrous Materials: Properties, Composition and uses of Grey cast iron, malleable iron, S.G iron and steel.
Non Ferrous Metals: Copper alloys-brasses and bronzes. Aluminum alloys-Al-Cu, Al-Si, Al-Zn alloys.

Module-V

Testing of Materials: Non-Destructive Testing, Tensile testing, compression testing - Hardness Testing. Impact testing, Fatigue testing, Creep, other related testing methods characterization of TEM, XRD, SEM.

TEXT & REFERENCE BOOKS:

1. Materials Science and Engineering: An Introduction – W. D. Callister.
2. Engineering Materials – Kenneth G. Budinski and Michael K. Budinski.
3. Material Science and Engineering – V. Raghavan.
4. Engineering Materials and Metallurgy – U. C. Jindal.
5. An introduction to Metallurgy– Alan Cottrell.

COURSE OUTCOMES:

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

CO1: Explain different types of material crystal structures, arrangement of atoms and mechanical properties of materials.
CO2: Explain the concept of equilibrium diagram, cooling curves and phase diagrams for pure metals and alloys.
CO3: Understand the application of various heat treatment operations.
CO4: Identify the different types of materials, alloys and explain its properties.
CO5: Apply and explain various methods of material testing procedures.

Mapping of Course Outcomes (COs) onto Program Outcomes (POs) and Program Specific Outcomes (PSOs):

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

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

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SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
Department of Industrial & Production Engineering
NEP 2020–Scheme of Teaching & Examination
W.E.F. Session: 2024-2025
B. TECH SECOND YEAR, IV SEMESTER

SN	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme			Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment	Semester Examination Assessment	Total Marks	
			L	T	P	CIA	SEA		
1	IPUDTT3	Industrial Engineering	3	–	–	40	60	100	3
2	IPUDTT4	Fluid Engineering	3	–	–	40	60	100	3
3	IPUDTT5	Manufacturing Process-I	3	–	–	40	60	100	3
4	IPUDTT6	Engineering Mathematics-C	3	–	–	40	60	100	3
5	IPUDTP_	*Professional Elective-1/2*	3	–	–	40	60	100	3
6	_UDTO_	*Open Elective*	3	–	–	40	60	100	3
Total			**18**	–	–	**240**	**360**	**600**	**18**
PRACTICALS									
1	IPUDLT3	Fluid Engineering Lab	–	–	2	25	25	50	1
2	IPUDPF1	Mini Project	–	–	4	50	50	100	2
Total			**–**	**–**	**6**	**75**	**75**	**150**	**3**
GRAND TOTAL			**18**	-	**6**	**315**	**435**	**750**	**21**

List of Department/ Professional Elective		
SN	Course No.	Subject
1.	IPUDTP1	Material Management
2.	IPUDTP2	Safety Management and Labour Law

Institute Core/ Open Elective offered by the Department			
SN	Course No.	Subject	Offering Department
1.	IPUDTO2	Introduction to Manufacturing Processes	IPE

Internal Assessment: – Two class tests of 15 marks each will be conducted. Moreover, 5 marks will be for attendance and 5 marks are allocated for the Assignments, surprise test, quiz test etc.

Approved in BOS meeting held on 28.06.2024

Semester	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme						Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment				Semester Examination Assessment	Total Marks	
						CIA						
			L	T	P	CT–1	CT–2	Assignment, surprise test, quiz test etc	Attendance	SEA		
B. Tech. IV Sem.	IPUDTT6	Engineering Mathematics-C	3	-	-	15	15	5	5	60	100	3

COURSE LEARNING OBJECTIVES:

This course will enable the students to:

1. Understand the Laplace Transforms, properties of Laplace Transform, inverse Laplace Transform and some applications to solve the differential equations.
2. Understand the fundamental concepts of Complex Analysis which will enrich them to have a good knowledge to apply in real life problems.
3. Solve algebraic, transcendental equations and system of linear equations and ordinary differential equations.
4. Use the basic probability rules, including additive and multiplicative laws, adopt the knowledge of various Probability distributions and their applications.
5. Explain the basic ideas of measures of central tendency, dispersion correlation and regression.

COURSE CONTENT:

Unit-I

Laplace Transform: Laplace and inverse Laplace transforms, and their properties. Application of Laplace transforms to ordinary linear differential equations.

Unit-II

Functions of Complex Variables: Cauchy-Riemann equations, Analytic functions, Complex integration, Cauchy's integral theorem, Cauchy's integral formula, Taylor series,

Unit-III

Numerical Methods: Numerical solutions of linear and nonlinear algebraic equations, Integration by trapezoidal and Simpson's rules, Solution of ordinary differential equations by Picard and Taylor's methods

Unit-IV

Basics of Probability: Definitions of Probability and Probability Theorems, conditional probability, random variables binomial, Poisson , normal and exponential distributions

Unit-V

Statistics: Mean, Median, mode and standard deviation, correlation and regression.

TEXT & REFERENCE BOOKS:

1. Fundamental of Mathematical Statistics– S. C. Gupta and Kapoor, Sultan Chand and Sons, 1980.
2. Mathematical Statistics –M. Ray.
3. Higher engineering mathematics. B.S. Grewal, *Khanna Publishers, New Delhi*
4. Numerical Methods in Engineering & Science with Programs in C, C++ & MATLAB, B.S. Grewal, Khanna Publishers.
5. Numerical Methods, P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand and Company Ltd.

COURSE OUTCOMES:

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

Course Outcomes: Upon successful completion of this course, students will be able to:

CO1: Solve the differential equations by Laplace transform.
CO2: Identify the nature of complex analytic functions and find complex integration.
CO3: Solve different kind of equations numerically
CO4: Solve the problems regarding uncertainty.
CO5: Analyze the data and draw the valid conclusions.

Mapping of Course Outcomes (COs) onto Program Outcomes (POs) and Program Specific Outcomes (PSOs):

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

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

Semester	Course No.	Subject	Teaching Hours/ Week/ Periods			Evaluation Scheme						Credits
			Theory Lectures	Tutorials	Practical	Continuous Internal Assessment				Semester Examination Assessment	Total Marks	
			L	T	P	CIA				SEA		
						CT–1	CT–2	Assignment, surprise test, quiz test etc	Attendance			
B. Tech. IV Sem.	IPUDTP2	Safety Management and Labour Law	3	-	-	15	15	5	5	60	100	3

COURSE OBJECTIVES:

1. To understand roles, responsibilities, importance of health safety and welfare in work places.
2. To impart knowledge about material handling, air pollution control system, fire prevention and protection.
3. To learn about safety audit, disaster control, safety principles.
4. To understand the labour laws and various acts, applicable to industries.

COURSE CONTENT:

Module-I

Safety management: Concept's evolution of modern safety concept, safety policy, safety in organization, line and staff functions for safety, safety committee, budgeting for safety, techniques incident recall technique (IRT), disaster control, job safety analysis (JSA), safety survey, safety inspection, safety sampling, safety audit.

Safety in material handling: Ergonomic consideration in material handling, design, installation, operation and maintenance of conveying equipment, hoisting, traveling and slewing mechanisms.

Module-II

Design of air pollution control system: Industrial sources of air pollution, emission factors, regulations control strategies, policies, gaseous pollutant control: gas absorption in tray and packed towers, absorption with/without chemical reaction, removal of SO_2, absorption in fixed blades- breakthrough, removal of HCs/VOCs, NOx removal, wet scrubbers.

Integrated air pollution control systems: Pollution control in process industries, pollution control in process industries like cement, paper, petroleum, petroleum products, textile, tanneries, thermal power plants dying and pigment industries, eco-friendly energy.

Module –III

Industrial Safety - Industrial accidents, causes and effects, safety devices in machines, electrical hazards and protections, personal protective devices.

Fire prevention and protection: Sources of fire , fire triangle, principles of fire extinguishing, active and passive fire protection systems, various classes of fires, A, B, C, D, E, types of fire extinguishers, fire stoppers, hydrant pipes, hoses, monitors, fire watcher's layout of stand pipes, fire station, fire alarms and sirens

Module-IV

Industrial relations – Industrial disputes, reasons and methods of settling Industrial disputes, Trade unions and its functions, rules. Handling of workers grievances, steps in handling of workers grievances, workers participation in mgmt. need and forms of workers participation in mgmt.

Industrial psychology - meaning and roles of Industrial psychology , importance in labor mgmt.

Module-V

Industrial legislations –meaning and classifications , Industrial acts , The factory act 1948, workers compensations act 1923 , minimum wages act 1948 ESI Act 1948 , industrial dispute Act 1947 , the payment of wages Act 1936 , Mining Act 1948 , and various amendment in acts .

TEXT& REFERENCEBOOKS:

1. Accident Prevention Manual for Industrial Operations,N.S.C.Chicago,1982.
2. Industrial Accident Prevention, H.W Heinrich,1980, McGraw-HillCompany, New York.
3. HandBook of Fire Technology, R.S.Gupta, Orient Longman,1977,Bombay.
4. Accident Prevention manual for industrial operations,N.S.C.Chicago,1982.
5. Fire and explosion protection, Dinko Tuhtar.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. To acquire the knowledge of substantive as well as procedural contents of safety management and labour laws.
2. To develop an insight into the wages law, factory act etc.
3. To gather an understanding of natures of accidents and its effects.
4. To gather an understanding of natures of various types of hazards in industry.

Mapping of Course Outcomes (COs) onto Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOs1	PSOs2	PSOs3
CO1	3	2	3	1	-	2	2	-	2	-	2	2	3	2	3
CO2	3	2	2	2	-	3	2	-	-	-	2	1	3	2	2
CO3	3	3	2	3	-	2	3	-	-	-	2	2	2	3	2
CO4	3	3	3	3	-	2	2	-	1	-	2	2	3	2	2
CO5	3	3	3	2	-	2	2	-	2	-	2	2	2	2	-

- **1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)**

Approved in BOS meeting held on 28.06.2024