Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

w.e.f. July 2023

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical			L	T	P	
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work					
1	IP81	PEC/DLC	Professional Elective Course-IV	70	20	10	-	-	100	3	1	-	4
2	IP82	OEC/DLC	Open Elective Course-III	70	20	10	-	-	100	3	1	-	4
3	IP83	PI	Major Project / Internship	-	-	-	150	100	250	-	-	16	8
			Total	140	40	20	150	100	450	**6**	**2**	**16**	**16**

Note: 1. Departmental BOS will decide list of three/four optional subjects those are available in MOOC/NPTEL, PEC as well for OEC.

Professional Elective Course-IV		
S.No.	**Subject Code**	**Subject Name**
1	IP81A	Computer Integrated Manufacturing
2	IP81B	Management Information System
3	IP81C	Industrial Psychology & Human Behaviour
4	IP81D	Finite Element Methods

Open Elective Course-III		
S.No.	**Subject Code**	**Subject Name**
1	IP82A	Entrepreneurship & Management Concept
2	IP82B	Work Design and Ergonomics
3	IP82C	Comupter Aided Manufacturing
4	IP82D	Concurrent Product Design

Note: 2. Students going for internship would have to opt MOOC/NPTEL subjects decided / listed by the HOD / Coordinator.

Professional Elective Course-IV		
S.No.	**Subject Code**	**Subject Name**
1	IP81D	NPTEL-1
2	IP81E	NPTEL-2
3	IP81F	NPTEL-3

Open Elective Course-III		
S.No.	**Subject Code**	**Subject Name**
1	IP82D	NPTEL-4
2	IP82E	NPTEL-5
3	IP82F	NPTEL-6

Note: 3. For Major Project/ Internship, evaluation is based on work done, quality of report, presentation and performance in viva-voce through department project supervisor / Industry Project Coordinator.

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

PEC: Professional Elective Course, OEC: Open Elective Course, PI: Project and Internship, DLC: Distance Learning Course

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
IP81 A	Computer Integrated Manufacturing	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	100	L	T	P	4
		70	20	10	-	-		3	1	-	

Course Objective:

- To explain the scope of Computer Integrated Manufacturing Business forecasting and aggregate production plan
- To explain the Computer Aided Process Planning (CAPP)
- To be provide the knowledge about automated material handling, automated storage and Retrieval System.
- To familiar about CAM, Computer Numerical Control, Manual and Computer Aided Part Program.

COMPUTER INTEGRATED MANUFACTURING
(IP81 A)

Module 1 Introduction to CIM: Objectives of CIM, Enterprise wide Integration of CIM Information requirements of manufacturing organizations, Scope of Computer Integrated Manufacturing Business forecasting and aggregate production plan, Production Activity Control (PAC), Manufacturing as a system, Production processes on volume-variety axes, Importance of batch and job shop production, CIM definition and CIM wheel, Evolution and benefits of CIM, Automation, Types of Automation, Advantages of Automation.

Module II Computer Aided Process Planning (CAPP): Introduction to CAPP, Objectives to CAPP, Introduction to Process Planning, Approaches to Process Planning, Manual Experience-based Process Planning, Computer Aided Process Planning, Approaches to Computer Aided Process Planning, Variant Process Planning, Advantages and Disadvantages, Generative Process Planning, Advantages and Disadvantages, Knowledge-based Process Planning, Feature Recognition in Computer Aided Process Planning, Approaches to Part Feature Recognition, Recent Trends in Computer Aided Process Planning.

Module III Computer Aided Manufacturing: Introduction to CAM, Numerical Control system, Suitability of NC technology, Need of NC system, Features and classification of NC system, Computer Numerical Control, Features of CNC , Direct Numerical Control, NC words used in part program, Manual and Computer Aided Part Program, APT Programming.

Module IV Automated Material Handling and Storage: Introduction and Objectives of Automated Material Handling, Principles of Automated Material Handling, Factors considered in selection of automated material handling equipment's, Material handling Equipment, Conveyor systems, Cranes and Hoists, Industrial Trucks, Monorail, Automated Guided Vehicle, Automated storage and Retrieval System.

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Module V Group Technology: Importance of batch and job shop production, Merits of converting zigzag process layout flow to smooth flow in cellular layout, Production flow Analysis and clustering methods, Concept of part families and coding, Optiz, MIClass and Dclass coding, FMS.

Text Books

1. Roa. P.N. CAD/CAM, Tata McGraw Hill Publishing Co.
2. S.Kant Vajpay, Principles of CIM, PHI Publishing Co.
3. Radhakrishan P.CAD/CAM/CIM, New age Publishing Co.

References

1. Zeid A. CAD/CAM, Tata McGraw Hill Publishing Co.
2. Roa. CAD/CAM, Tata McGraw Hill Publishing Co.

Course Outcomes:

At the completion of this course, students should be able to-

CO1	Understand the scope of Computer Integrated Manufacturing
CO2	Do Business forecasting and aggregate production plan
CO3	Understand automated material handling, automated storage and Retrival System.
CO4	familiar about CAM, Computer Numerical Control, Manual and Computer Aided Part Program
CO5	To understand group technology.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	0	0	2	1	1	0	1	1	1
CO2	2	2	1	1	1	0	0	1	0	1	0	1
CO3	2	1	1	1	1	0	0	1	0	1	1	1
CO4	3	3	2	2	2	2	1	0	1	1	1	1
CO5	2	1	2	2	1	2	1	0	1	1	1	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP81 B	Management Information System	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To acquire the basic knowledge Management Information System.
- To establish knowledge regarding system engineering, information & e business technology, planning & controlling and enterprise management system.

Course content:

MANAGEMENT INFORMATION SYSTEM
(IP 81 B)

Module-I: Management Information System (MIS): Concept of MIS, Definition, role of Management Information System, Objectives and benefits, MIS as strategic tool, obstacles and challenges for MIS, functional and cross functional systems, hierarchical view of CBIS, structured and unstructured decision, Decision process and MIS, information system components and activities, Value chain and MIS support. Database and data structures.

Module -II: System Engineering : System concepts, System control , Types of System, handling System, complexity system, efficiency and effectiveness, classes of system ,data processing system, business function processing system transaction processing system, Integrated information processing system, application processing system ,system analysis, need for system analysis, procedure for analyzing the existing system, work system model and comparison with input-process-output model, five views of work system, knowledge based systems.

Module -III: Information and e business technology: Information concepts, classification of information method of data and information collection, Value of information, information storage and retrieval system, general model of a human as an information processor, MIS and the Information and knowledge, introduction to e business, models of e business, MIS in web environment, MIS and e business, Information technology and computer NW support to MIS

Module -IV: Planning and control Concepts: concept of corporate planning, dimensions of planning, Essentiality of strategic planning, Development of business strategic, types of strategies, tools of planning, MIS strategic business planning ,(SDLC) system development life cycle ,system investigation, analysis of needs, design and implementation phases, Control and Maintenance of Information Systems.

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Module -V: Enterprise management System: EMS system concept, Enterprise resource planning (ERP)system ERP models and modules, benefits of ERP, ERP product Evolution, ERP implementation (ERP) from MRP, information management in SCM, Customer relationship management (CRM), Integrated data model in ER Business Process Re-Engineering (BPR), significance and functions,

References

1. Davis and Olson, Management Information Systems, TMH
2. James O' Brian, Management Information Systems, TMH
3. Oz, Management Information Systems, Cengage
4. Alter Stevenson, Information Systems: Foundation of E-Business; (Prentice-Hall, USA)
5. Jayaraman, Business Process Re-Engineering, TMH.
6. Garg. V.K.; ERP, PHI
7. Kelkar SA; Management Information Systems A Concise Study; PHI Learning.
8. Radhakrishnan R and Balasubramanian S; Business Process Reengineering; PHI Learning.
9. Alex Leon; ERP, TMH
10. Jawadekar WS; MIS- text and cases; TM

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the basic knowledge Management Information System.
CO2	To establish knowledge regarding system engineering.
CO3	To build-up knowledge of information & e-business technology.
CO4	To know about planning & controlling concepts.
CO5	To know about enterprise management system.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Material Science & Metallurgy Lab

List of Experiment (Expendable):

1. To study micro-structures of metals/alloys.
2. To study crystal structure of a given specimen.
3. To study crystal imperfections in a given specimen.
4. To study heat treatment process (Hardening & tempering) of steel specimen.
5. To study the properties of various types of plastic.
6. To study Bravais lattices with the help of model.

Course Outcomes:

At the completion of this course, students should be able to-

CO1	Understand Crystal Atoms of Solid.
CO2	Understand Plastic Deformation of Metals.
CO3	Understand Alloy Formation and Binary Diagram.
CO4	Understand Heat Treatment of Alloys Principles of Heat Treatment of Steel.
CO5	Understand Properties of Material.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Corse Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1	2	2	1	0	3	1	2
CO2	2	2	3	2	2	2	2	1	1	3	2	2
CO3	2	2	3	3	2	2	1	1	0	2	2	2
CO4	1	2	3	2	3	2	2	0	1	3	2	2
CO5	2	2	3	3	2	2	1	0	1	3	2	2

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP81 C	Industrial Psychology & Human Behavior	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To acquire the basic knowledge of Industrial Psychology & human behavior.
- To establish knowledge regarding maintenance of human resource, industrial relations & group behavior.

Course content:

INDUSTRIAL PSYCHOLOGY AND HUMAN BEHAVIOR
(IP81 C)

Module -I Industrial Psychology: Basic concepts, Role and Application, Discipline, Fatigue, Accidents, Labour welfare, Supervision.

Module –II Maintenance of Human Resource: Health, Safety, Labor welfare, Welfare measures, Human Relations, Personnel audit, Industrial Safety, Safety efforts by government, Safety programs.

Module – III Industrial Relations: Objective, Industrial unrest, Industrial peace, Parties in industrial relations, Organizational conflicts, Industrial disputes and their settlement, Impact of Conflicts, Sources of conflicts, Labor policy, Worker's grievances, Suggestion system

Module - IV Human Behavior: Attitudes and Job satisfaction, Emotions and Moods, Personality and values, Perception and Decision making.

Module –V Group Behavior: Foundation of group behavior, Understanding work teams, Communication, power and Politics, Conflicts and Negotiations

Reference Books:

1. Industrial Organization and Engineering Economics – T.R. Banga and S.C. Sharma
2. Organization Behavior – Stephen P. Robbins, Timathy A. Judge and Neharika Vohra
3. organizational Behavior part-1 and Part-2 –John B. Miner

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the basic knowledge of industrial psychology.
CO2	To establish knowledge regarding maintenance of human resource.
CO3	To build-up knowledge of industrial relations.
CO4	To know about human behavior.
CO5	To know about group behavior.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP81 D	Finite Element Methods	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To get the knowledge of finite element methods.
- To enhance the knowledge about coordinates and matrices and various approaches of FEM.
- To provide the knowledge of high order & iso parametric formulation.
- To gain the knowledge about solid and structural mechanisms.

Course content:

FINITE ELEMENT METHODS
(IP81 D)

Module -I: General procedure of finite element method: Basic concept of FEM, Engineering applications, Comparison of FEM with other methods of analysis, Discretization of the domain-Basic element shapes, discretization process, Interpolation polynomials, Selection of the order of the interpolation polynomial, Convergence requirements, Linear interpolation

Module -II: polynomials in terms of global and local coordinates, Formulation of element characteristic matrices and vectors-Direct approach, variational approach, weighted residual approach, Assembly of element
matrices and vectors and derivation of system equations together with their solution.

Module -III: High-- order and iso-parametric element formulations: Introduction, Higher order one-dimensional element, Higher order elements in terms of natural coordinates and in terms of classical interpolation polynomials, Continuity conditions, Iso-parametric elements, Numerical integration in one, two and three-dimensions.

Module -IV: Solid and structural mechanics: Introduction, Basic equations of solid mechanics, Static analysis-Formulation of equilibrium equations, analysis of trusses and frames, analysis of plates, analysis of three-dimensional problems, analysis of solids of revolution, Dynamic analysis-Dynamic equations of motion, consistent and lumped mass matrices, consistent mass matrices in global coordinate system, Dynamic response calculation using FEM

Module -V: Applications and generalization of the finite element METHOD: Energy balance and rate equations of heat transfer, Governing differential equation for the heat conduction in three-dimensional bodies, Derivation of finite element equations for one-dimensional, two-dimensional, unsteady state and radiation heat transfer problems and their solutions, Solution of Helmholtz equation and Reynolds equation, Least squares finite element approach.

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

RECOMMENDED BOOKS:

1. The Finite Element Method in Engineering – S.S. Rao, Pub.- Pergamon Press.
2. Numerical Methods in Finite Element Analysis—Klaus-Jurgen Bathe and Edwar L. Wilson, Pub.- PHI.
3. The Finite Element Method – O.C. Zienkiewicz – McGraw-Hill
4. The Finite Element Methods for Engineers – K.H. Huebner – Wiley, New York

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the knowledge about general procedures of FEM.
CO2	To enhance the knowledge about coordinates and matrices and various approaches of FEM.
CO3	To provide the knowledge of high order & iso parametric formulation.
CO4	To gain the knowledge about solid and structural mechanisms.
CO5	To acquire the knowledge about applications and generalization of FEM.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP82 A	Entrepreneurship & Management Concept	70	20	10	-	-	100	3	1	-	4

Course Objective:

- Explain the meaning of management its characteristics and clarify management as science or profession.
- To be familiar intellectual property system, copyrights, trademark and intellectual property rights.
- To explain the marketing concept and advertising CRM and marketing research.
- To provide the knowledge of entrepreneur, classification, function and sociological and economic theories of entrepreneurship.

MANAGEMENT & ENTREPRENEURSHIP CONCEPTS
(IP82 A)

Module I: Management: Importance, definition and functions; schools of theories, BCG matrix, SWOT analysis, steps in decision making, structured and unstructured decision; dimensions of organizations, departmentalization, spam and line of control, technology and Mintzberg organization typology, line and staff organization, business process reengineering and process of change management, leader & manager, leadership grid, Maslow's need hierarchy and Herzberg two factor theory, team work and stress management, , HR planning placement and training

Module II: Marketing: Importance, definition, core concepts of need want and demand, exchange & relationships, product value, cost and satisfaction (goods and services) marketing environment; selling, marketing and societal marketing concepts; four P's, product, price, placement, promotion; consumer, business and industrial market, market targeting, advertising, publicity, CRM and market research.

Module III: **Finance:** Nature and scope, forms of business ownerships, balance sheet, profit and loss account, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis, pay-back period, NPV and capital budgeting.

Module IV: Intellectual Property System: Introduction, Definition of Intellectual property, Concept of Intellectual Property, Different Types of IP, Intellectual Property Rights (IPR), Benefits of securing IPRs;, Rationale behind Intellectual Property, Enforcement of IPRs, Patent Law in India, Interpretations and Implementations, Copyrights and related rights, Trademarks, Geographical indications, Industrial designs, Trade secrets and layout of Integrated circuits , Indian Legislations for the protection of various types of Intellectual Properties; TRIPs and various provisions in TRIPs Agreement.

H.O.D.
Industrial & Production
Engineering Depar
Jabalpur Engineering
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Module V: Entrepreneurship: Definition and concepts, characteristics, comparison with manager, Becoming an Entrepreneur, Need for Entrepreneurship, Benefits of Self-Employment, who is an entrepreneur? Sensing opportunities- Sources of Idea, Creating Efforts, SWOT Analysis, Entrepreneur and Economy, classification and function of entrepreneurs, sociological and economic theories of entrepreneurship, entrepreneur traits and behavior, roles in economic growth.

References:

1- Daft R; The new era of management; Cengage.

2- Bhat Anil, Arya Kumar; Management: Principles, Processes and Practices; Oxford higher Edu.

3- Davis & Olson; Management Information System; TMH.

4- Steven Alter; Information systems, Pearson, www.stevenalter.com

5- Kotler P; Marketing management;

6- Khan, Jain; Financial Management;

7- ILO; Work study; ILO.

8- Mohanty SK; Fundamental of Entrepreneurship; PHI.

Course Outcomes:

At the completion of this course, students should be able to-

CO1	Understand management its characteristics and clarify management as science or profession.
CO2	Understand intellectual property system, copyrights, trademark, and intellectual property rights.
CO3	Understand marketing concept and advertising CRM and marketing research.
CO4	Make balance sheet and calculate breakeven point.
CO5	Understand need for Entrepreneurship and Benefits of Self-Employment

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	2	1	0	0	2	1	1	0	1	1	1
CO2	0	2	1	1	1	0	0	1	0	1	0	1
CO3	0	1	1	1	1	0	0	1	0	1	1	1
CO4	0	3	2	2	2	2	1	0	1	1	1	1
CO5	0	1	2	2	1	2	1	0	1	1	1	1

H.O.D.
Industrial & Production
Engineering Departm
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP82 B	Work Design & Ergonomics	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To acquire the basic knowledge of work study, work processes & motion study.
- To establish knowledge regarding work sampling, measuring and motion economy.

Course content:

WORK DESIGN AND ERGONOMICS
(IP 82 B)

Module I: Introduction to work study - Productivity – scope of motion and time study - Work methods design.

Module II: Motion study-process analysis – process chart – flow diagram – assembly process chart – man and machine chart – two handed process chart - Micro motion and memo motion study. Work measurement and its methods.

Module III: Work sampling – Determining time standards from standard data and formulas – Predetermined motion time standards – work factor system – methods time measurement, Analytical Estimation.

Module IV: Measuring work by physiological methods – heart rate measurement – measuring oxygen consumption– establishing time standards by physiology methods.

Module V: Motion economy- Ergonomics practices – human body measurement – layout of equipment – seat design - design of controls and compatibility – environmental control – vision and design of displays. Design of work space, chair table.

RECOMMENDED BOOKS:

1. Barnes, Raeph. M., "Motion and Time Study – Design and Measurement of Work ", John Wiley & sons, New York, 1990.
2. McCormick, E.J., "Human Factors in Engineering and Design", McGraw Hill.
3. ILO, "Introduction to Work study ", Geneva, 1974.

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the basic knowledge of work study.
CO2	To establish knowledge regarding motion study.
CO3	To build-up knowledge of work sampling.
CO4	To know about work measuring.
CO5	To know about motion economy.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP82 C	Computer Aided Manufacturing	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To acquire the basic knowledge of computer aided manufacturing.
- To establish knowledge regarding machine Centre, CNC programming, automated material handling, automated assembly & inspection & various control techniques.

Course content:

Computer Aided Manufacturing
(IP 82 C)

MODULE I

Machine Centre: Principles of Numerical control, Types of CNC Machine Tools, Features of CNC Systems, Direct numerical control (DNC), Elements of CNC viz. Ball screws, rolling guide ways, structure, drives and controls, standard controllers, Manual part programming with APT, Virtual machining. Machining Centers and Interpolators

MODULE II

CNC Programming: Types, Manual Part Programming, Canned Cycle, Offset, APT.

MODULE III

Automated Material Handling: Types of Material Handling System, Configuration, Equipment's, Elements AGVS, ASRS, Carousal System, Design & Analysis of Material Handling System, Conveyors, Stores& Storage Systems.

MODULE IV

Automated Assembly & Inspection: Automated Assembly Systems, Automated Inspection Principles & Methods, Sectors Automated inspection principles and methods – sectors techniques for automated inspection - techniques for automated inspection – contact and non-contact inspection methods – in processes automated measuring methods – machine vision – optical inspection methods. Automatic identification.

MODULE V

Techniques: Shop floor control – factory data collection system – Bar code techniques Computer for local area network – the future automated factory – Human workers in future automated factory – The impact on the society, Digital Manufacturing.

H.O.D.
Industrial & Production
Engineering Depar...
Jabalpur Engineering ...
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

REFERENCES:

1. Mikell P. Grover, Automation, Production System and Computer Integrated Manufacturing, Prentice Hall of India Pvt Ltd, 1995.
2. C. Ray Astaihe, Robots of Manufacturing automation, John Wiley and Sons, New York.
3. Jon Stenerson and Kelly Curran "Computer Numerical Control", Prentice-Hall of India Pvt. Ltd. New Delhi, 2008
4. Ibrahim Zeid "CAD/CAM – Theory and Practice" Mc Hill, International edition, 1998
5. P. N. Rao "CAD/Cam principles and operations", Tata McGraw Hill
6. Reference Manuals of FANUC, Siemens, Mazak, etc.
7. Thomas M. Crandell "CNC Machining and Programming, Industrial Press ISBN- 0-8311-3118-7
8. Bedworth, Wolfe and Henderson – "Computer aided design and manufacturing" – McGraw Hill
9. A. Ghosh and Malik – "Manufacturing Science" Affiliated East West Press Pvt. Ltd.
10. Tilak Raj – "CNC Technology and Programming", DhanpatRai Publication Company.

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the basic knowledge of CNC.
CO2	To establish knowledge regarding CNC programming.
CO3	To build-up knowledge of automated material handling.
CO4	To know about automated assembly & inspection.
CO5	To know about various control techniques.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
IP82 D	Concurrent Product Design	70	20	10	-	-	100	3	1	-	4

Course Objective:

- To acquire the basic knowledge of concurrent product design.
- To establish knowledge regarding design process, design cost estimations, material & manufacturing process selection and product development approaches.

Concurrent Product Design
(IP 82 D)

Module I: Introduction: Types of design, importance of design, design considerations, product life cycle, technology life cycle, benchmarking, and mass customization. Concurrent design team its elements.

Module II: Product Design Process: Steps in design, Functional requirement analysis, Axiomatic design, Product design specifications, concurrent design model.

Module III: Material And Manufacturing Process Selection In Design: Factors influencing material and process selection, approaches, tools and software used in selection. Design For 'X': An introduction: Design for manufacturing, assembly and dissemble, an overview of DF'X'. Deign for maintainability and serviceability, design for environment, design for aesthetic, design for packaging, design for handling, design for safety, etc.

Module IV: Design Cost Estimation: Need, cost indexes, categories; cost-capacity factors; design to cost and life cycle costing.

Module V: Product Development Approaches: Concurrent engineering, partnership with supplier, collaborative and Internet based design, Design Project Management: PDM tools.

Reference Books

1. Dieter George E., Engineering Design, McGraw Hill Publication, 2000.
2. Ulrich Karl T and Eppinger Steven D., Product design and development, McGraw Hill Publication, 1995.
3. Chitale A.K. and Gupta R.C. Product Design and Manufacture, Prentice-Hall of India, New Delhi
4. Bralla, James G., Handbook of Product Design for Manufacturing, McGraw Hill Publication

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Course Outcomes:

At the completion of this course, students should be able to

CO1	To acquire the basic knowledge of concurrent product design.
CO2	To establish knowledge regarding product design process.
CO3	To build-up knowledge of material & manufacturing process selection.
CO4	To know about design cost estimation.
CO5	To know about product development approaches.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VIII Semester (Industrial & Production Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
IP83	Major Project/Internship	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	250	L	T	P	8
		-	-	-	150	100		-	-	16	

Major project /Internship
(IP-83)

The Major Project Work provides students an opportunity to do something on their own and under the supervision of a guide. Each student shall work on an approved project, which should be selected from some real life problem as far as possible, which may involve fabrication, design or investigation of a technical problem. The project work involves sufficient work so that students get acquainted with different aspects of manufacturing, design or analysis. The students also have to keep in mind that in final semester they would be required to implement whatever has been planned in the major project in this semester. It is possible that a work, which involves greater efforts and time, may be taken up at this stage and finally completed in final semester, but partial completion report should be submitted in this semester and also evaluated internally. At the end of semester, all students are required to submit a synopsis.

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)

Course Outcomes:

At the completion of this course, students should be able to

CO1	To build-up the knowledge about IPR.
CO2	To get the knowledge of law of patent.
CO3	To enhance the knowledge about copyright law.
CO4	To acquire the knowledge about law of trademarks.
CO5	To acquire the knowledge about law of industrial design.

Mapping of Course outcomes (COs) with Program Outcomes (POs):

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	0	0	1	0	1	0
CO2	0	2	1	0	1	1	0	1	0	1	0	0
CO3	0	1	1	1	2	0	1	0	0	0	0	1
CO4	0	1	0	0	1	0	0	0	0	0	0	0
CO5	0	0	1	1	0	0	0	0	0	0	0	1

H.O.D.
Industrial & Production
Engineering Department
Jabalpur Engineering College
Jabalpur (M.P.)

DEAN
Academic
JEC, Jabalpur (M.P.)