SAMARTH EDUCATIONAL TRUST
SAWKAR INSTITUTES
SATARA
Since 1986

AGCE

SYLLABUS FIRST YEAR

Bachelor of Vocation

Syllabus and Course Structure of First Year B.Voc (Industrial Tool Manufacturing) Programme at Arvind Gavali College of Engineering, Satara - Designed to nurture foundational knowledge, practical skills, and holistic development for future engineers

ARVIND GAVALI COLLEGE OF ENGINEERING, SATARA.

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First Year B.Voc Industrial Tool Manufacuring 2025-26
SEMESTER I

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing	
1	PCC	25BVT1101	Machine Tool Technology	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
2	PCC	25BVT1102	General Mechanical Engineering-I	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
3	PCC	25BVT1103	Industrial Engineering	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
4	PCC	25BVT1104	Measurement Technique and Tools	3	0	0	3	3	CA1	10		40
									MSE	20		
									CA2	10		
									ESE	50	20	
5	IKS	25BVT1105	Constitution of India	2	0	0	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									ESE	--	--	
6	AEC	25BVT1106	Communication Skill	2	0	0	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									ESE	--	--	
7	PCC	25BVT1101L	Machine Tool Technology Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
8	PCC	25BVT1102L	General Mechanical Engineering-I Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
9	PCC	25BVT1103L	Industrial Engineering Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
10	PCC	25BVT1104L	Measurement Technique and Tools Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	

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• BCA 6545, MCA 6545, B.Voc 6545

11	OJT	25BVT1107	Metal Arc Welding (CSC/Q0204)	0	0	0	0	12	CA1 CA2 OE	50 50 100	 40	80
			Total	**16**		**08**	**24**	**32**		**1100**		
Total Contact Hours-24 Total Credits - 32												

First Year B.Voc Industrial Tool Manufacturing 2025-26
SEMESTER II

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing	
1	PCC	25BVT1201	Industrial Management	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
2	PCC	25BVT1202	Total Quality Management	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
3	PCC	25BVT1203	Entrepreneurship	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
4	PCC	25BVT1204	General Mechanical Engineering - II	3	0	0	3	3	CA1	10		40
									MSE	20		
									CA2	10		
									ESE	50	20	
5	AEC	25BVT1205	Development of Life Skills	2	0	0	2	2	CA1	25		20
									MSE	--		
									CA2	25		
									CA2	--	--	
6	PCC	25BVT1201 L	Industrial Management Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
7	PCC	25BVT1202 L	Total Quality Management Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
8	PCC	25BVT1203 L	Entrepreneurship Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
9	PCC	25BVT1204 L	General Mechanical Engineering – II Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
10	OJT	25BVT1206	CNC Setter Cum Operator (CSC/Q0120)	0	0	0	0	12	CA1	50		80
									CA2	50		
									OE	100	40	
			Total	**14**		**08**	**22**	**30**		**1050**		
Total Contact Hours –22 Total Credits - 30												

Title of the Course: Industrial Management Course Code: 25BVT1201	L	T	P	Credit
	3	--	--	3

Course Prerequisite:
Basic business concepts, understanding of industry practices

Course Description:
This course introduces the fundamentals of industrial management, covering the growth and organization of industries, public and private sector operations, wage systems, cost elements, and incentives. It also addresses labor, industrial, and tax laws, along with the roles and responsibilities of supervisors and technicians. Emphasis is placed on material management, including ABC analysis, inventory control, and quality standards, to equip students with the knowledge and skills needed for efficient industrial operations.

Course Objectives:
Subject aims to provide this student with

1. Explain the growth of industries and the principles of managing men, materials, and machines.
2. To describe different forms of business organization in public and private sectors, and their merits and demerits.
3. To outline wage systems, incentive schemes, and the components of industrial costs.
4. To familiarize students with key labour, industrial, and tax laws relevant to industrial operations.
5. To introduce material management concepts, including ABC analysis, inventory control techniques, and quality standards

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain the growth of industries, principles of managing men, materials, and machines, sources of capital, and perform basic break-even analysis.
CO2	Compare the characteristics, merits, and demerits of public and private sector industries, and describe different organizational structures and departmental functions.
CO3	Apply material management techniques such as ABC analysis, inventory control, and quality standards to optimize resource utilization.
CO4	Understand wage systems, incentive schemes, and the components of industrial costs.
CO5	Apply management principles

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3			3							
CO2	3	3	3	2	3	2	3			2	
CO3	2	3		3							3
CO4	3	1	3	1		2	3		2	2	
CO5	3		3				3	3		1	1

Assessment Scheme
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Introduction** Growth of industry, The management of men, materials and machines, the art of management, Sources of capital- industrial individual enterprise, private partnership and private Ltd. Co., Joint Stock Co. shares, debentures, financial agencies and their role in promoting industries. Break even analysis.	**08**
2	**Private sector and public sector** Public sector enterprise, merits and demerits of public sector industry and private sector industry, Line, staff and functional organizations, reasons for the choice of various types of organization, functions of different departments, viz. stores, purchase and sales departments relationship between individual departments.	**08**

3	**Wages & Expenses** Definition of wages, real wage and nominal wage, systems of wage payment, incentives, financial and non - financial incentives, Essentials of a good wage plan, essentials of a good incentive, scheme. Introduction to elements of cost & indirect expenses, Material cost, labour cost, fixed and variable overheads, components of cost, selling price, Factory expenses, administrative expenses, selling & distribution expenses, depreciation, obsolescence, interest on capital, Idleness, Repair and maintenance.	**08**
4	**Labour, industrial & tax laws** Evolution of industrial law, factory act, workmen compensation act, payment of wages act, employee's state insurance act, Industrial dispute act. Role of technician in industry: Position of technician in various engineering departments, Role of a supervisor in industry, Foremanship, duties and qualities of a good foreman.	**08**
5	**Material management** Introduction, Scope of Material Management selective control, techniques ABC analysis, Material handling, inventory control, Essential steps in inventory control, quality standards.	**08**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Industrial Engineering and Management	O.P. Khanna	Khanna Publishers
2	Industrial Engineering and Production Management	Martand Telsang	S. Chand Publications
3	Industrial Engineering	M. Mahajan	Dhanpat Rai Publications

Useful Links:
1. https://nptel.ac.in/courses/110/107/110107116/
2. https://www.cips.org/supply-management/abc-analysis/
3. https://www.indiacode.nic.in/handle/123456789/1794

Title of the Course: Total Quality Management Course Code: 25BVT1202	L	T	P	Credit
	3	--	--	3

Course Prerequisite: Students should have a basic understanding of manufacturing processes, production systems, and industrial engineering concepts. Familiarity with fundamental statistics (mean, standard deviation, control limits) and basic process planning is recommended. Prior exposure to quality inspection methods, shop floor operations, and basic management principles will help in effectively understanding Total Quality Management tools, philosophies, and implementation strategies.

Course Description:

This course provides comprehensive knowledge of Total Quality Management (TQM) principles, practices, and tools for achieving excellence in products, processes, and services. It covers the fundamentals of quality concepts, quality planning, cost of quality, and leadership in quality management. The course also introduces management planning tools, benchmarking methods, and lean manufacturing concepts such as Just-in-Time (JIT) and Kanban systems. Additionally, it explores Total Productive Maintenance (TPM) to enhance equipment efficiency, reliability, and overall operational performance

Course Objectives:

Subject aims to provide this student with

1. To explain the fundamental concepts, dimensions, and principles of Total Quality Management.
2. To develop an understanding of leadership roles, strategic planning, and quality councils in driving organizational excellence.
3. To apply continuous process improvement techniques such as PDCA, Juran Trilogy, 5S, Kaizen, and statistical quality control tools.
4. To familiarize students with management planning tools and benchmarking practices for performance improvement.
5. To understand the philosophy, pillars, and implementation strategies of Total Productive Maintenance (TPM) for achieving high equipment efficiency

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain the concepts, dimensions, and principles of Total Quality Management, including cost of quality and leadership roles.
CO2	Apply continuous improvement tools such as PDCA, Juran Trilogy, 5S, Kaizen, and statistical quality control charts for process enhancement.
CO3	Utilize management planning tools and benchmarking techniques to analyze and improve organizational performance.
CO4	Implement Just-in-Time (JIT) philosophy, Kanban systems, and related techniques to improve production efficiency and reduce waste.
CO5	Interpret the concepts, pillars, and stages of Total Productive Maintenance (TPM) to improve equipment effectiveness and reliability

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3			3							
CO2	3	3	3	2	3						
CO3	2	3		3							3
CO4	3	1	3	1					2		
CO5	3		3					3			1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Introduction, Basic concepts of total quality management** Introduction to Quality, Dimensions of Quality, Quality Planning, Concept and definition of quality cost, Determinants of Quality, Optimum cost of performance, Principles of TQM, Pillars of TQM, Introduction to leadership and Leadership roles, Quality council and Quality statement, Strategic Planning Process, Deming philosophy.	**08**
2	**Continuous process improvement** Input /output process Model, Juran trilogy, PDCA Cycle, 5 –'S' Housekeeping principle, Kaizen Seven tools of Quality (Q-7 tools), Check Sheet, Histogram, Cause and effect diagram, Pereto diagram, Stratification analysis, Scatter diagram, Control charts, Control chart for variables & process capability, Control chart for attributes.	**08**

3	**Management planning tools & Bench marking** Affinity diagram, Relationship diagram, Tree diagram, Matrix diagram, Matrix data analysis, Arrow Diagram, Process decision programme chart (PDPC), Concept of bench marking, Reason to bench marking, Bench marking process, Types of bench marking, Benefits of bench marking.	**08**
4	**Just in time (JIT)** JIT philosophy, Three elements of JIT, Principles of JIT Manufacturing, JIT Manufacturing building blocks, JIT benefits, Kanban & 2 Bin Systems.	**08**
5	**Total productive maintenance (TPM)** Concept of Total Productive Maintenance, Types of maintenance, OEE (Overall Equipment Efficiency), Stages in TPM implementation, Pillars of TPM, Difficulties faced in TPM implementation	**08**

Text Books

Sr. No.	Title	Author	Publisher
1	Engineering Metrology	R. K. Jain	Khanna Publishers
2	Industrial Engineering	M. Mahajan	Dhanpat Rai Publications

Useful Links:

1. https://nptel.ac.in/courses/110/105/110105108/
2. https://asq.org/quality-resources/seven-basic-quality-tools
3. https://www.leanproduction.com/just-in-time.html

Title of the Course: Entrepreneurship Course Code: 25BVT1203	L	T	P	Credit
	3	--	--	3

Course Prerequisite: Students should have a basic understanding of business principles, economic environment, and general management concepts. Familiarity with fundamentals of industrial operations, marketing, and finance will be helpful to grasp the entrepreneurial development processes, institutional support systems, and legal frameworks covered in this course. No prior specialized knowledge of entrepreneurship is required, making this course accessible for beginners aiming to develop entrepreneurial skills and venture creation capabilities.

Course Description:

This course introduces the fundamentals of entrepreneurship, focusing on the characteristics of successful entrepreneurs and the classification and types of industries. It covers the process of entrepreneurial development including product and site selection, plant layout, and the importance of institutional support. The course also provides an overview of the tax system, insurance, and relevant industrial laws essential for entrepreneurs. Finally, it guides students through the preparation of a comprehensive project report, including the introduction to ISO 9000 quality standards, equipping them with the practical skills needed for successful venture planning and implementation.

Course Objectives:

Subject aims to provide this student with:

1. To understand the role and characteristics of entrepreneurs and the classification of industries.
2. To develop skills in product selection, site planning, and plant layout for new ventures.
3. To familiarize students with the entrepreneurship support system, including various government agencies and their functions.
4. To provide a basic understanding of the tax system, insurance, and industrial laws relevant to entrepreneurship.
5. To enable students to prepare comprehensive project reports and introduce them to quality standards such as ISO 9000.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Describe the characteristics of entrepreneurs and classify different types of industries.
CO2	Analyze and select appropriate products, sites, and layouts for new business ventures.
CO3	Identify and explain the roles of various institutions and support systems available to entrepreneurs.
CO4	Summarize the basics of tax systems, insurance policies, and relevant industrial laws impacting entrepreneurship
CO5	Prepare a detailed project report following prescribed formats and understand the significance of ISO 9000 quality standards.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3			3							
CO2	3	3	3	2	3					1	
CO3	2	3		3			1	2		2	3
CO4	3	1	3	1					2		
CO5	3		3					3			1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Entrepreneurship and entrepreneur** Need of Employment and Opportunities, Essential Characteristics of a good Entrepreneur, Industrial Policy, Classification of industries- Micro, small scale, Medium scale, Large scale, Type of industries- Production, Job based & Service.	**08**
2	**Entrepreneurial Development** Product identification/ selection, Site selection, Plant layout, Institutional support needed, Pre-market survey, Control chart for attributes.	**08**
3	**Entrepreneurship Support System and Start-ups** Introduction to start-up's, Role of District Industries Centre in setting up industry, Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC, KVIC, RSMML, Role of state finance corporation, state electricity corporations, pollution control board, BIS, I.S.O. etc.	**08**

4	**Introduction to Tax System, Insurance and Acts** Idea of income tax, sales tax, excise duty and custom duty, Industrial and fire insurance, procedure for industrial insurance, Introduction to Industrial acts, factory act, Workmen's compensation act 1923, Apprentices act 1961, Environmental protection act 1986.	**08**
5	**Project Report Preparation** Procedure of preparing a project report, Format of project report, Preparation of project report, Introduction to ISO: 9000 Series of Quality System.	**08**

Text Books

Sr. No.	Title	Author	Publisher
1	Entrepreneurship Development	S.S. Khanka	S. Chand Publication
2	"Dynamics of Entrepreneurial Development and Management"	Vasant Desai	Himalaya Publishing House

Useful Links:

1. https://www.slideshare.net/kavithapandian/entrepreneurship-18138879
3. https://nptel.ac.in/courses/112/104/112104217/

Title of the Course: General Mechanical Engineering – II Course Code: 25BVT1204	L	T	P	Credit
	3	--	--	3

Course Prerequisite:

Students should have a foundational understanding of basic thermodynamics, fluid mechanics, and engineering mathematics. Prior knowledge of general engineering principles including properties of gases and fluids, fundamentals of heat transfer, and mechanical systems is essential for grasping the working principles and applications of compressors, propulsion systems, heat exchangers, and cooling towers. A background in introductory mechanical or aerospace engineering concepts will be helpful.

Course Description:

This course provides a comprehensive overview of key mechanical and thermal engineering systems used in industrial and aerospace applications. It covers the working principles, types, and applications of various air compressors, including reciprocating and rotary types. Students will learn about jet and rocket propulsion systems, emphasizing turbojet, turboprop, and solid/liquid propellant rockets. The course also explores fundamental modes of heat transfer conduction, convection, and radiation with associated laws and concepts. Additionally, it introduces heat exchangers, detailing their classification, construction, and operation, focusing on shell-and-tube and plate types. Finally, the design and functioning of cooling towers, including natural, forced, and induced draft types, are studied to understand their role in thermal management systems.

Course Objectives:

Subject aims to provide this student with

1. To explain the working principles, types, and applications of reciprocating and rotary air compressors.
2. To understand the fundamentals of jet and rocket propulsion systems, including different engine types and propellant systems.
3. To comprehend the modes of heat transfer—conduction, convection, and radiation—and apply relevant laws governing these processes.
4. To classify, describe the construction, and analyze the working of various types of heat exchangers and their industrial applications.
5. To identify types of cooling towers, understand their construction and operation, and evaluate their role in thermal systems.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain the working principles and applications of reciprocating and rotary air compressors
CO2	Describe the basic concepts and types of jet and rocket propulsion systems.
CO3	Apply the fundamental laws of conduction, convection, and radiation to solve heat transfer problems.

CO4	Classify different heat exchangers and analyze their construction and working for industrial applications.
CO5	Identify and explain the types, construction, and working of cooling towers used in thermal management.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3	1		1							
CO2	3	1		1	1	2	1			2	
CO3	3		1	1				1			1
CO4	3	1	1	1		2			2	2	
CO5	3									1	1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Air Compressors** Working & applications of reciprocating air compressors, Rotary Compressors – Screw, centrifugal, lobe type, vane type, axial flow compressor, difference between reciprocating & rotary compressor.	**08**

2	**Jet & Rocket propulsion Jet Propulsion:** Turbojet, turboprop engines, Rocket propulsion: Solid & liquid propellant systems.	**08**
3	**Heat Transfer** Modes of heat transfer - Conduction, convection and radiation. Conduction Fourier's law, Convection - Newton's law of cooling, natural and forced convection. Radiation absorptivity, transmissivity, reflectivity, emissivity, black body, gray body, Stefan Boltzmann law	**08**
4	**Heat Exchangers** Heat Exchangers - Classification, construction and working of shell and tube, plate type heat exchanger and its applications	**08**
5	**Cooling Towers** Construction and working of natural, forced and induced draught cooling tower	**08**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Mechanical Engineering	Khurmi & Gupta	S Chand
2	General Mechanical Engineering	J K Kapoor	S. Chand Publications
3	Thermal Engineering	R K Rajput	Laxmi Publications

Useful Links:
1. https://nptel.ac.in/courses/112/105/112105197/
2. https://www.engineeringtoolbox.com/air-compressors-d_173.html
3. https://www.khanacademy.org/science/physics/forces-newtons-laws/rockets/a/rocket-

Title of the Course: Development of Life Skills Course Code: 25BVT1205	L	T	P	Credit
	2	--	--	2

Course Prerequisite:

1. Basic Communication Skills: Ability to communicate effectively in spoken and written forms.
2. Self-Awareness: Understanding of one's own strengths, weaknesses, values, and goals.
3. Positive Attitude: Willingness to learn, grow, and develop a positive mindset.

Course Description:

Development of Life Skills is a subject designed for B.Voc students to equip them with essential life skills that enhance their personal and professional growth. This course focuses on developing skills such as communication, teamwork, time management, problem-solving, leadership, and adaptability, enabling students to navigate the challenges of the modern workplace and beyond. Through interactive sessions, case studies, and practical exercises, students learn to build confidence, resilience, and a positive attitude, preparing them to excel in their chosen careers and make a meaningful impact in their communities.

Course Objectives:

By the end of this course, the students will be able to:

1. Effective Communication Skills: The ability to communicate effectively in personal and professional settings, including verbal, non-verbal, and written communication.
2. Self-Awareness and Emotional Intelligence: A deeper understanding of themselves and others, including emotional intelligence, self-awareness, and empathy.
3. Problem-Solving and Decision-Making Skills: The skills to analyze problems, identify solutions, and make informed decisions in personal and professional contexts.
4. Personal and Professional Growth Strategies: Strategies to manage stress, build resilience, and cultivate a growth mindset, enabling them to achieve their personal and professional goals.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand their strengths, weaknesses, values, and goals, and develop a growth mindset.
CO2	Collaborate effectively with others, including teamwork, leadership, and conflict resolution.
CO3	Analyze problems, identify solutions, and make informed decisions using critical thinking and problem-solving skills.
CO4	Prepare career plan considering their knowledge and skillset.
CO5	Importance of emotional intelligence in enhancing personal and organizational effectiveness.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	1						2		1	2	
CO2	2	2	3				2	1			
CO3			3				1			2	
CO4	2						1		3	3	
CO5	1						2		1	2	

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2) will have 50% weightage, respectively.

Assessment Component	Marks
CA1	25
MSE	--
CA2	25
ESE	--

CA1 and CA2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Personal Development** Importance of self-discipline, Need of Self Analysis, Attitude and types (positive, negative, optimistic and pessimistic) Guidelines for developing positive attitude, Time Management - Importance, prioritization of work, time matrix, time savers, and time wasters, Stress Management - types of stress, causes of stress, managing stress, and stress busters	**06**
2	**Interpersonal and Leadership Skills** Interpersonal Relation Importance, Interpersonal conflicts, Resolution of conflicts, developing effective interpersonal skills, telecommunication and conversational skills, Human Relation Skills (People Skills), Role of leadership in workshops, Basics of motivating teams, Decision-making skills, delegating tasks, Building team trust, Industry leadership practices, Handling workplace challenges.	**06**

3	**Problem-Solving Skills** Identifying issues/problems, Identify, understand and clarify the problem, Root cause analysis, Critical thinking basics, Information search, Evaluate the evidences, Consider the feasible option, Choose the best alternative, Handling challenges, Decision-making models, Industry problem-solving approaches, Documenting solutions.	**06**
4	**Career Development** Importance of continuous learning, Resume building, Industry certifications, Job interview preparation, Networking in industrial sectors, Career path options, Characteristics of Goal setting (SMART-Specific, Measurable, Attainable, Realistic, Time bound), Goal setting techniques, Building workplace confidence, Work ethics, Industry professionalism expectations. Lokpal, Lok Ayukta, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet	**06**
5	**Emotional Intelligence** Role of emotional intelligence, managing workplace emotions, Building empathy, Handling stress in teams, Improving interpersonal skills, Industry applications, Benefits for professional growth.	**06**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	The 7 Habits of Highly Effective People	Stephen R. Covey	Free Press
2	Emotional Intelligence	Daniel Goleman	Bantam Books
3	Business Communication Strategies	M.M. Monippally	McGraw Hill Education

Useful Links:
1. https://www.franklincovey.com/the-7-habits/
2. https://www.danielgoleman.info/topics/emotional-intelligence/
3. https://open.lib.umn.edu/businesscommunication/

Title of the Course: Industrial Management Laboratory Course Code: 25BVT1201L	L	T	P	Credit
	--	--	2	1

Course Prerequisite: Students should have a foundational understanding of basic management principles, industrial organization, and fundamental accounting concepts. Prior knowledge of industrial laws, wage systems, material management, and quality standards will be beneficial for effectively analyzing and interpreting industry related case studies. Basic skills in data collection, report writing, and analytical thinking are also recommended.

Course Description:

This course focuses on practical understanding of industrial management concepts through detailed case studies. Students will analyze real-world scenarios related to financial agencies, wage systems, industrial laws, inventory control, material management, quality standards, incentive schemes, and taxation in various types of industries. The course emphasizes the application of theoretical knowledge to assess industrial practices, fostering analytical skills and enhancing decision-making capabilities relevant to modern industrial environments.

Course Objectives:

Subject aims to provide this student with

1. To analyze the role of various financial agencies in promoting industrial growth through real world case studies.
2. To understand wage structures, expenses, and legal frameworks such as the Payment of Wages Act by examining industry-specific cases.
3. To evaluate inventory control methods and material management practices used in industries, focusing on ABC analysis and quality standards.
4. To study incentive schemes for employee motivation and their impact on industrial productivity.
5. To compare different types of industrial organizations and understand the taxation systems applicable to them through comparative case analyses.
6. To develop the ability to apply theoretical knowledge to practical industry scenarios, enhancing problem-solving and decision-making skills in industrial management.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Analyze the functions and impact of financial agencies in promoting Industries through case study evaluations.
CO2	Examine wage structures, expenses, and legal compliance such as the Payment of Wages Act in industrial settings.
CO3	Apply inventory control techniques, including ABC analysis, and assess material management practices used in industries.
CO4	Evaluate incentive schemes and their effectiveness in motivating employees within industrial environments.
CO5	Compare different organizational forms of industries and interpret various tax systems applicable to them.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3			2	1					2	1
CO2	3	2		2		2	3				1
CO3	3	2	1	2	3		3	2	2	2	1
CO4	3	2	2	3	3	2				2	1
CO5	3	2		2							1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2) having 50% weightage and OE is having 50% weightage

Assessment Component	Marks
CA1	25
CA2	25
OE	50

CA1 and **CA2** are based on Practical performance, attendance and oral discussion

Course Contents

Practical No.	List of Experiments	Hours
1	Case study on different financial agencies & their role in promoting industries	**02**
2	Case study on wages & expenses incurred in any industry.	**02**
3	Case study on payment of wages act.	**02**
4	Case study on ABC analysis.	**02**
5	Case study on inventory control in any industry.	**02**
6	Case study on quality standards used in industry.	**02**

7	Case study on good incentive schemes used in any industry for employee motivation.	**02**
8	Comparative study of different types of industries like proprietorship, private partnership, joint stock Company etc	**02**
9	Case study on different taxes applicable to different industries.	**02**
10	Case study on material management in industry.	**02**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Industrial Engineering; Management	O.P. Khanna	Dhanpat Rai & Co.
2	Quality control; Management	Dale H. Besterfield	Pearson

Title of the Course: Total Quality Management Laboratory Course Code: 25BVT1202L	L	T	P	Credit
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Course Prerequisite:

1. Basic Quality Management Concepts: Understanding the fundamentals of quality management systems, including terminology and objectives.
2. Introduction to Continuous Improvement Tools: Familiarity with continuous improvement methodologies like PDCA (Plan-Do-Check-Act), Kaizen, and 5S principles.
3. Control Charts Fundamentals: Basic knowledge of statistical process control (SPC), control charts concepts, types of control charts (for variables and attributes).
4. Quality Control Tools : Understanding the 7 basic quality control tools (Cause & Effect Diagram, Check Sheet, Control Charts, Histogram, Pareto Chart, Scatter Diagram, Flow Chart).

Course Description:

This course provides an in-depth study of essential quality management and process improvement techniques widely used in industries. Through case studies and practical examples, students will explore the application of the PDCA (Plan-Do-Check-Act) cycle and 5S principles in real-world company settings. The course includes detailed examination of Kaizen methodology for continuous improvement. Students will learn to draw and interpret control charts for both variables and attributes, enabling effective process monitoring and quality control. The curriculum covers the use of the 7 basic quality control (QC) tools as well as advanced QC tools through industry-based case studies.

Course Objectives:

Subject aims to provide this student with

1. Understanding of Quality Improvement Cycles: Knowledge of the PDCA (Plan-Do-CheckAct)cycle and its practical application in continuous process improvement.
2. Implementation of Workplace Organization: Ability to apply the 5S principle to organize and standardize work environments for enhanced efficiency.
3. Familiarity with Continuous Improvement Practices: Insight into Kaizen methodology with real-life examples to foster ongoing incremental improvements.
4. Skills in Statistical Process Control: Competence in drawing and interpreting control charts for both variables and attributes to monitor and control quality.
5. Proficiency in Quality Control Tools

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Apply the PDCA cycle effectively to plan, implement, monitor, and improve processes in real-life situations.
CO2	Implement 5S principles to organize and maintain a clean, efficient, and safe workplace.
CO3	Construct and interpret control charts for variables and attributes to analyze process stability and quality performance.

CO4	Use the 7 basic quality control tools and advanced QC tools to identify,analyze, and solve quality- related problems in industries.
CO5	Analyze real-world case studies to integrate theoretical knowledge with practical industrial applications of quality and lean management tools.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	1			1	1					2	1
CO2	1	2		2		2	3				1
CO3	1	2	1	1	3		3	2	2	2	1
CO4	1	2	2	1	3	2				2	1
CO5	1	2		2							1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2) having 50% weightage and OE is having 50% weightage

Assessment Component	Marks
CA1	25
CA2	25
OE	50

CA1 and **CA2** are based on Practical performance, attendance and oral discussion

Course Contents

Practical No.	List of Experiments	Hours
1	Case study on application of PDCA cycle in real life.	**02**
2	Study of application of 5S principle in company.	**02**
3	Case study of Kaizen with real life example	**02**
4	Draw & interpret control charts for variables for given data.	**02**
5	Draw & interpret control charts for attributes for given data.	**02**
6	Case study on use of 7 basic QC tools in any industry.	**02**

7	Case study on use of advanced QC tools in any industry	**02**
8	Case study on JIT technology with example.	**02**
9	Case study on poka yoke with example.	**02**
10	Case study on Kanban & 2 bin systems used in any industry	**02**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Industrial Engineering; Management	O.P. Khanna	Dhanpat Rai & Co.
2	Quality control; Management	Dale H. Besterfield	Pearson

Title of the Course: Entrepreneurship Laboratory Course Code: 25BVT1203L	L	T	P	Credit
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Course Prerequisite:
Basic understanding of Entrepreneurship and Business Concepts, Report Writing and Communication Skills,Basic Financial Literacy, Market Research Fundamentals, Awareness of Government Schemes and Support Systems, Project Management Basics, Analytical and Critical Thinking Skills.

Course Description:
The course covers essential business planning skills, including product development, process selection, and market survey techniques necessary for startup success. It also introduces students to financial concepts like Return on Investment (ROI), Return on Sales (ROS), and break-even analysis through real-life case studies of successful startups. By the end of the course, students will be equipped with practical knowledge and skills to conceptualize, plan, and manage new business startups effectively.

Course Objectives: subject aims to provide this student with:

1. Understanding of Entrepreneurship Fundamentals: Knowledge of the traits, risks, and opportunities associated with entrepreneurship as a career.
2. Business Planning Skills: Ability to prepare detailed reports on product development, process selection, and market surveys for startups.
3. Market and Feasibility Assessment: Capability to conduct market surveys and techno-commercial feasibility studies for startup ideas.
4. Familiarity with Support Systems: Awareness of government schemes and incubation centers (MCED, MSME, KVIC, Atal Innovation Mission) that assist startups.
5. Critical Thinking and Decision Making: Enhanced analytical skills to evaluate technology life cycles and business viability in real-world entrepreneurial contexts.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Explain the key traits and risks associated with entrepreneurship and assess entrepreneurship as a viable career option.
CO2	Prepare detailed reports on new product development, process selection, and market surveys essential for launching a startup.
CO3	Calculate and interpret financial metrics such as ROI, ROS, and break-even points to evaluate business performance.
CO4	Conduct techno-commercial feasibility studies to assess the viability of startup ideas.
CO5	Identify and utilize government schemes and incubation resources available for startups, including MCED, MSME, KVIC, and Atal Innovation Mission.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3		3	3							
CO2	3	3		2	3						
CO3	2	3	3	3							3
CO4	3	1		1					2		
CO5	3		3					3			1

Assessment Scheme
Two components of Continuous Assessment (CA-1, CA-2) having 50% weightage and OE is having 50% weightage

Assessment Component	Marks
CA1	25
CA2	25
OE	50

CA1 and **CA2** are based on Practical performance, attendance and oral discussion

Course Contents

Practical No.	List of Experiments	Hours
1	Preparation of report on entrepreneurship as a career	**02**
2	Case study on 'Traits of Entrepreneur'	**02**
3	Case study on 'Risks associated with enterprise'	**02**
4	Preparation of report on 'Development of new Product'	**02**
5	Preparation of Report on 'Process selection ' for new startup	**02**
6	A Case study on 'Technology life cycle' of any successful entrepreneur	**02**
7	Market survey for setting up new Start up.	**02**
8	Case study on 'Return on sales (ROS)'of any successful startup.	**02**

9	Preparation of report on ’Brake even point calculation’ of any enterprise.	**02**
10	Preparation of report on ‘feasibility of any Techno-commercial business’	**02**

Text Books			
Sr. No.	**Title of Book**	**Name of Author(s)**	**Publisher**
1	Quality Control and Industrial Statistics	A. K. Gupta	S. Chand Publishing
2	Total Quality Management	Dale H. Besterfield	Pearson

Title of the Course: General Mechanical Engineering – II Laboratory Course Code: 25BVT1204L	L	T	P	Credit
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Course Prerequisite:

1. Basic Knowledge of Thermodynamics: Understanding of fundamental thermodynamic concepts such as heat, work, energy, and laws of thermodynamics.
2. Fundamentals of Heat Transfer: Familiarity with conduction, convection, and radiation heat transfer principles.
3. Understanding of Engineering Materials: Basic awareness of thermal properties of materials, including insulating and conducting materials.
4. Basic Mechanical Engineering Concepts: Exposure to machinery and equipment such as compressors, turbines, and engines.
5. Mathematical and Experimental Skills: Ability to perform calculations, analyze experimental data, and interpret results.

Course Description:

This course provides practical and theoretical knowledge in thermal engineering, focusing on the measurement and analysis of heat transfer and fluid flow phenomena. Students will perform experiments such as measuring the discharge of air using an air box and determining thermal conductivity of metals through conduction setups. Through a combination of experimental trials and case studies, students will gain comprehensive insights into heat transfer mechanisms, fluid machinery, and propulsion technologies relevant to mechanical and aerospace engineering fields..

Course Objectives: subject aims to provide this student with:

1. Practical Skills in Thermal Measurements: Ability to conduct experiments to measure air discharge, thermal conductivity, and radiative heat transfer constants.
2. Understanding of Heat Transfer Equipment: Knowledge of the construction, working, and classification of various industrial heat exchangers.
3. Familiarity with Cooling Technologies: Comparative understanding of different types of cooling towers, including conventional and advanced systems.
4. Insight into Propulsion Systems: Basic knowledge of turbojet, turboprop, and rocket propulsion through detailed case studies.
5. Comparative Understanding of Compressors: Ability to distinguish between reciprocating and rotary compressors and their applications.

Course Outcomes:

CO	After the completion of the course the student should be able to:
CO1	Measure and analyze air discharge using an air box and interpret the results accurately.

CO2	Conduct experiments to determine thermal conductivity of metallic rods through conduction setups.
CO3	Calculate the Stefan-Boltzmann constant from radiation heat transfer experiments.
CO4	Identify, classify, and explain the construction and working principles of various heat exchangers used in industry.
CO5	Analyze the working and performance of propulsion systems such as turbojet, turboprop engines, and rockets through case studies. Mission..

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3		3	3							
CO2	3	3		2	3						
CO3	2	3	3	3							3
CO4	3	1		1					2		
CO5	3		3					3			1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2) having 50% weightage and OE is having 50% weightage

Assessment Component	Marks
CA1	25
CA2	25
OE	50

CA1 and **CA2** are based on Practical performance, attendance and oral discussion

Course Contents

Practical No.	List of Experiments	Hours
1	Measurement of discharge of air using air box.	02
2	Conduct a trial on conduction set up of metallic rod and calculate thermal conductivity.	02
3	Conduct a trial on Stefan Boltzmann set up and calculate Stefan Boltzmann constant.	02
4	Identify different equipment's in laboratory having heat exchangers and classify heat exchangers. Write construction and working any 03 of above heat exchangers	02
5	Comparative study of conventional cooling towers, cooling towers used in power plants & upcoming cooling towers.	02
6	Case study on turbojet engines	02
7	Case study on turboprop engine.	02
8	Case study on rocket propulsion.	02
9	Comparative study of reciprocating & rotary compressors.	02
10	Case study on insulating & conducting materials used in various applications.	02

Text Books			
Sr. No.	Title of Book	Name of Author(s)	Publisher
1	Thermal Engineering	R. K. Rajput	Laxmi Publications
2	Heat and Mass Transfer	P. K. Nag	Tata McGraw-Hill

Title of the Course: Metal Arc Welding / MIG MAG or GMAW Welder / Assistant TIG Welder/ CNC Setter Cum Operator (CSC/Q0120)/ CNC Operator – VMC (CSC/Q0116) Course Code: 25BVT1206	L	T	P	Credit
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Course Prerequisite:

1. Basic knowledge of Engineering Materials and their mechanical properties.
2. Understanding of fundamentals of manufacturing processes.
3. Awareness of shop floor safety protocols & safe handling of tools.

Course Description:

This course is designed to provide hands-on industrial exposure in real manufacturing environments. The course enables trainees to apply theoretical knowledge to practical shop-floor operations, including welding, CNC machine setup, operation, quality inspection, and safety practices. Emphasis is placed on developing technical competence, understanding engineering drawings, operating modern manufacturing equipment, maintaining quality standards, and following industrial safety and discipline, thereby enhancing employability and readiness for skilled roles in the manufacturing sector.

Course Objectives:

Subject aims to provide this student with

1. To develop the ability to apply theoretical knowledge to practical industry scenarios, enhancing problem-solving and decision-making skills in industrial management.
2. To provide practical exposure to industrial welding and CNC machining operations in a real shop-floor environment.
3. To develop skills in machine setup, operation, and process control as per engineering drawings and specifications.
4. To enhance understanding of quality standards, inspection methods, and defect identification.
5. To instill industrial safety practices, discipline, and teamwork.
6. To bridge the gap between theoretical knowledge and industry requirements, improving employability.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Apply safe working practices and industrial discipline while performing welding and CNC machining operations.
CO2	Operate and assist in setting up welding equipment and CNC machines (VMC) according to job requirements and engineering drawings.
CO3	Execute basic to intermediate welding and machining operations to produce components within specified tolerances.
CO4	Inspect finished jobs using appropriate measuring and visual inspection tools and identify defects.

CO5	Demonstrate professional skills such as teamwork, communication, and problem-solving, meeting industry expectations and employability standards.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	2			1	3	1		1		1	1
CO2	2	1	1	1	3		1	1	1		1
CO3	2	1	1	1	3		1	1	1	1	1
CO4	2	1	1	1	3					1	1
CO5	2	1		1	3						1

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2) having 50% weightage and OE is having 50% weightage

Assessment Component	Marks
CA1	50
CA2	50
OE	100

CA1 and **CA2** are based on Practical performance, attendance and oral discussion

Course Contents

Select any one of the qualifier pack which is not completed in semester I

1. Metal Arc Welding (CSC/Q0204)
Choose any one from specified Group GTM2 of Qualification Packs other than that selected in GTM1.
Syllabus for this qualifier Pack is available on **http://www.cgsc.in/pdf/MMAW%20L3.pdf**

2. MIG MAG or GMAW Welder (CSC/Q0209)
Choose any one from specified Group GTM2 of Qualification Packs other than that selected in GTM1.
Syllabus for this qualifier Pack is available on **http://www.cgsc.in/pdf/MIG_MAG%20or%20GMAW%20Welder.p df**

3. Assistant TIG Welder (CSC/Q0212)
Choose any one from specified Group GTM2 of Qualification Packs other than that selected in GTM1.

Syllabus for this qualifier Pack is available on **http://www.cgsc.in/pdf/Assisstant%20Tungsten%20Inert%20Gas%20Welder%20(Fi nal).pdf**

4. CNC Setter Cum Operator (CSC/Q0120)
Choose any one from specified Group GTM2 of Qualification Packs other than that selected in GTM1.
Syllabus for this qualifier Pack is available on **http://www.cgsc.in/pdf/CNC%20Setter%20cum%20operator%20- %20Turning.pdf**

5. CNC Operator – VMC (CSC/Q0116)
Choose any one from specified Group GTM2 of Qualification Packs other than that selected in GTM1.
Syllabus for this qualifier Pack is available on **http://www.cgsc.in/pdf/CGSC%20CNC%20Operator%20-%20Vertical%20Machining%20Centre.pdf**