

BOS meeting held on 27-05-2025

Samrat Ashok Technological Institute (Engg. College) VIDISHA (M.P.)
(An Autonomous Institute Affiliated to RGPV, Bhopal)

Open Electives (for batch admitted 2023-24) w.e.f. 2025-26

B Tech V -Sem

OE -III OE-505(A) Industry 4.0 & 3-D Printing

OE-505 (A)

(B) ISO 9000 & Total Quality Management

OE-505 (B)

(C) Mechatronics & Automation

OE-505 (C)

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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Mechanical Engineering Department

Semester/Year		V/III	Program					B.Tech.			
Subject Category	OE-III	Subject Code:	OE-505 (A)	Subject Name:				Industry 4.0 & 3D Printing			
	Maximum Marks Allotted							Contact Hours			Total Credits
	Theory			Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Course Objective: Students undergoing this course are expected to

- This course is designed to provide a basic understanding of present Industrial revolution and Additive Manufacturing process. It will also help in understanding the journey of industrial revolution and introducing recent trends in advanced technologies and its implementation in the industries.

Course Outcomes:

After completion of the course, students would be able to -

- Understand about the Industry 4.0 (I4.0)
- Understand about the various components of Industry 4.0
- Understand about design and application of I4.0
- Understand about Additive Manufacturing (AM) and its different processes
- Apply the concepts of AM

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

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Industry 4.0 (I4.0): Introduction, State of Art, Industrial Revolutions, Principles of I4.0, attributes of I4.0, Characteristics of Industry 4.0, and Framework for Industry 4.0, Opportunities and challenges of I4.0, Roadmap of I4.0.	8	1
II	Components of Industry 4.0: Internet of Things (IOT), Industrial Internet of Things (IIOT), Cyber Physical System (CPS), Cyber security: Introduction, Block chain Technology, Autonomus Robot, Cobots,	8	2

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III	Components of I4.0 and its design and application: Virtual Reality (VR), Augmented Reality (AR), AR Hardware and Software, Industrial Applications of AR, Digital Twin, Concept of M2M Communication. Artificial Intelligence (AI), Design Prerequisites of Industry 4.0, What I4.0 fix in our business.	8	3
IV	Additive manufacturing (AM) (3-D Printing): Introduction, reason of evolution, conventional manufacturing, characteristics of AM, AM process chain, Types of AM processes: Polymerization, sintering and melting, Extrusion, 3-D Printing (Powder Binding Bonding), Layer Laminated Object Manufacturing.	8	4
V	Application of AM : Automotive, Aerospace, Medical, Art	8	5
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
Text Books-			
Ian Gibson. David Rosen. Brent Stucker, Additive Manufacturing Technologies, Springer, ISBN 978-1-4939-2112-6			
Andreas Gebhardt, Understanding Additive Manufacturing, Hanser Publication Cincinnati, ISBN-13:978-1-56990-507-4.			
Modes of Evaluation and Rubric			
There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 10 marks for lab work and 10 marks for quiz. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.			
Recommendation by Board of studies on		Date: 27.05.2025	
Approval by Academic council on		Date:	
Compiled and designed by		Dr. Pankaj Agarwal	
Checked and approved by			














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Mechanical Engineering Department

Semester/Year		V/III	Program				B.Tech.				
Subject Category	OE-III	Subject Code:	OE-505 (B)	Subject Name:			ISO 9000 and Total Quality Management				
	Maximum Marks Allotted						Contact Hours			Total Credits	
	Theory			Practical			Total Marks	Hours			
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Course Objective: Students undergoing this course are expected to

- This course is design with a view to explain and educate the students about the concepts of quality, quality assurance, tools and techniques of TQM Just- in- Time ,operating principles of ISO 9000.

Course Outcomes:

After completion of the course, students would be able to -

- Understand the Quality concept and Total Quality Management
- Understand the tools and techniques for Total Quality Management
- Understand World class quality. Just-in- Time and TQM.
- Understand the ISO 9000 series of Standards

Understand ISO 9000 based quality system requirements and their interpretations.

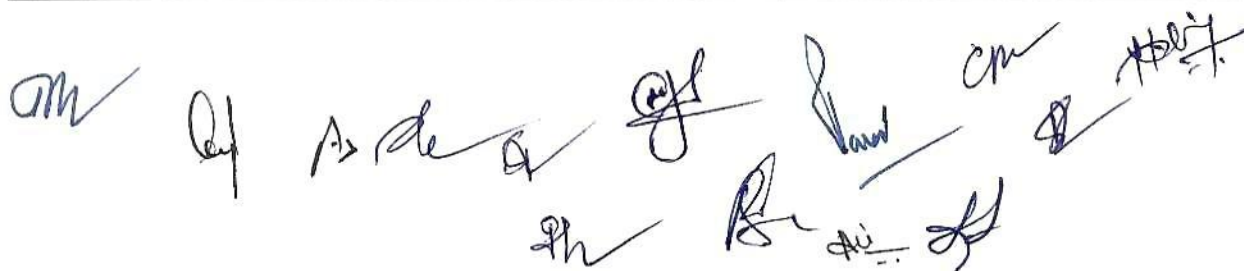
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	2	2	3	1	3	1		2
CO2	3	1	2	1		1	2					1
CO3	2	3	3	2	2	3	1					
CO4	1	2	2	2	1	2	1					2
CO5	2	2	2	1	2	1	1		2			2

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Quality concept, Phases of quality revolution, Quality Control, Quality Assurance, Total Quality Management, Principles for TQM, TQM system, Organisation structure for TQM, Contributions of Dming, Juran and Crosby	8	1
II	Tools and Techniques for Total Quality Management, Introduction, The 5-S campaign, TQC, TEI, Problem solving process, Quality Circles, Statistical Tools in Quality Control, QFD, Taguchi Approach for Quality, FMEA and FTA, Poka-Yoke, Kiazen, Process Capability, New Quality Improvement Techniques	8	2
III	World Class Quality and TQM, World Class Quality and Management and Measurement System, Just-in-Time and Total Quality Management. Barriers in implementing of TQM, Case Study on TQM	8	3

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IV	Evolution of ISO 9000, ISO 9000series of Standards. ISO 9000 and TQM, ISOv9000 Quality System Requirements, Installation of ISO 9000 Quality System, Registration and Certification for ISO 9000, Benefits of ISO 9000 Company, Malcolm Baldrige National Quality Award.	8	4
V	ISO 9000 based Quality System Requirements and their Interpretation, Management Responsibility, Contract Review, Design Control, Document and Data Control, Purchasing, Interpretation of control of Purchase Supplied Products, Process Control, Inspection and Testing, Non-Conforming Product, Handling, Storage, Packing, Preservation and Delivery, Quality Records, Quality Audit, QS9000,ISO 14000	8	5
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
Reference Books- <ol style="list-style-type: none"> 1. Total Quality Management by Dale H Besterfield, Pearson Education Asia. 2. The essence of Total Quality Management by John Blank, PHI 3. Kaizen by Masaki Imami, McGraw Hill ISO 9000 and Total Quality management By K C Jain, Khanna Publisher			
Modes of Evaluation and Rubric			
There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 10 marks for lab work and 10 marks for quiz. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.			
Recommendation by Board of studies on		Date: 27.05.2025	
Approval by Academic council on		Date:	
Compiled and designed by		Prof. Sanjay Jain	
Checked and approved by		Dr. Pankaj Agarwal	





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Mechanical Engineering Department

Semester/Year		V/III	Program					B.Tech.			
Subject Category	OE-III	Subject Code:	OE-505 (C)	Subject Name:			Mechatronics & Automation				
	Maximum Marks Allotted						Contact Hours			Total Credits	
	Theory			Practical		Total Marks					
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		Quiz				
60	20	10	10	-	-	-	100	3	0		0

Prerequisites: (Only for open electives) - Basic engineering concepts.

Course Objective: Students undergoing this course are expected to understand and integrate control systems, sensors, actuators, PLCs, and automation technologies, with a focus on Industry 4.0.

Course Outcomes:

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

- CO 1 Understand the Control System
- CO 2 Understand the Sensors transducers
- CO 3 Understand Hydraulic and Pneumatics system and Circuits
- CO 4 Understand the Motor and programming Logic Control systems
- CO 5 Understand the Automation and industry 4.0

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

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Mechatronics Systems: elements of mechatronics systems, measurements systems, control systems, transfer functions, procedure for determining the transfer functions of a control systems, representation of a control system by block diagram, modeling a control system, transient and steady state response, time response of a first order control systems, time response of a first order control systems	8	1

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II	Sensors and Transducers, characteristics parameters used in transducers, displacement sensor, position sensors, proximity sensor, motion sensors, light sensors, liquid flow sensor, digital transducers, Incremental optical encoders, absolute optical encoders.	8	2
III	Hydraulic and Pneumatic Actuating systems, Hydraulic systems, pneumatic systems, control valves, components of electro pneumatic systems, Pneumatic and hydraulic circuits.	8	3
IV	Mechanical and electrical actuating systems, D.C. motors, A.C. motors, stepper motors, servomotor, programmable logic controllers: introduction of PLC, PLC programming, application of PLC.	8	4
V	Automation: introduction, Principles and Strategies of Automation, safety Monitoring, maintenance and repair Diagnostics, error Detection and Recovery, levels of automations, Merits and Demerits of automation. Automated Guided Vehicles (AGV's), Automated Storage and Retrieval System (ASRS), Automatic identification methods: Overview of Automatic Identification Methods, Bar Code Technology, Radio Frequency Identification, Other AIDC Technologies. Industry 4.0: Introduction, IoT Techniques, Cloud computing, machine learning,	8	5
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
1. Mechatronics, K P Ramachandran, Wiley India Pvt. Ltd. 2. Mechanical measurement and instrumentation, R. K. Rajput, S.K. Kataria and Sons. 3. Mechatronics, W. Boltan, Pearson Education. 4. Mechatronics, N P Mahalik, Tata McGraw-Hill Publishing Limited 5. Modern Control Systems, Katsuhiko Ogata, Prentice Hall			
Modes of Evaluation and Rubric			
There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.			
Recommendation by Board of studies on		Date: 27.05.2025	
Approval by Academic council on		Date:	
Compiled and designed by		Dr. Ravindra Mohan Saxena	
Checked and approved by		Dr. Pankaj Agarwal	