

# Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

## SCHEME OF INSTRUCTION & SYLLABUS

Programme: Mechanical Engineering

Scheme of Instructions : Final Year B.Tech in Mechanical Engineering

Semester-VII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	ContactHrs./Wk	Credits	EXAMSCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PCC	BME4701	Refrigeration and Air Conditioning	4	-	-	4	4	15	15	10	60	100
2	PCC	BME4702	Additive Manufacturing & 3D Printing	3	-	-	3	3	15	15	10	60	100
3	PCC	BME4703	Lab- Refrigeration and Air Conditioning	-	-	2	2	1	-	-	25	25	50
4	PCC	BME4704	Advanced CAD Lab	-	-	2	2	1	-	-	25	25	50
5	PEC	BME4705-8	Professional Elective-V	4	-	-	4	4	15	15	10	60	100
6	OEC	B\$\$\$X01-14	Open Elective-III	4	-	-	4	4	15	15	10	60	100
7	OEC	B\$\$\$X01-14	Open Elective-IV	3	-	-	3	3	15	15	10	60	100
8	OEC	B\$\$\$X01-14	Open Elective-V	3	-	-	3	3	15	15	10	60	100
9	MCC	BAU4707	Behavioral and Interpersonal Skills	2	-	-	2	Audit	-	-	-	-	-
<b>Total</b>				<b>23</b>	<b>-</b>	<b>4</b>	<b>27</b>	<b>23</b>	<b>90</b>	<b>90</b>	<b>110</b>	<b>410</b>	<b>700</b>

**\*There will be two presentations, based on seminar topic to be selected in consultation with guide preferably based on emerging trends.**

**L-Lecture T-Tutorial P-Practical**

CT1-ClassTest1

TA/CA-Teacher Assessment/ Continuous Assessment

CT2-ClassTest2

ESE-End Semester Examination( For Laboratory End Semester performance)

Course Category	HSMC(Hum., Soc.Sc,Mgmt.)	BSC (BasicSc.)	ESC (Engg. Sc.)	PCC (Professional CoreCourses)	PEC (ProfessionalElectiveCourses)	OEC(OpenElectivecoursesfromtherdiscipline)	Project/Seminar /IndustrialTrainin g	MCC(Mandatory Courses)
Credits	-	--	--	9	4	10	-	Yes
CumulativeSum	11	25	24	48	15	15	3	--

**PROGRESSIVE TOTAL CREDITS: 124+23=147**

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HOD  
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Principal  
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## SCHEME OF INSTRUCTION & SYLLABUS

Programme : Mechanical Engineering

Scheme of Instructions :Final Year B.Tech in Mechanical Engineering

Semester–VIII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAMSCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	PCC	BME4801	Comprehensive Viva-voce	-	-	-	-	2	-	-	-	100	100
2	HSMS	BME4802	Extra-Curricular Activities/Co-Curricular Activities/Competitive Exam	-	-	-	4	2	-	-	100	-	100
3	PROJ	BME4803	Industry based Project/ Industry Internship	-	-	24	24	12	-	-	75	75	150
4	MCC	BAU4808	Project based Science, Technology, Social, Design and Innovation	-	-	2	2	Audit	-	-	-	-	-
<b>Total</b>				<b>4</b>	<b>-</b>	<b>26</b>	<b>30</b>	<b>16</b>	<b>-</b>	<b>-</b>	<b>175</b>	<b>175</b>	<b>350</b>

L-Lecture

CT1-ClassTest1

CT2-ClassTest2

T-Tutorial

TA/CA-Teacher Assessment/ Continuous Assessment

ESE-End Semester Examination (For Lab oratory End Semester performance)

P-Practical

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Professional Core Courses)	PEC (Professional Elective Courses)	OEC(Open Elective courses from other discipline)	Project/Seminar /Industrial Training	MCC(Mandatory Courses)
Credits	4	--	--	01	--	--	11	Yes
Cumulative Sum	15	25	24	49	18	18	14	--

**PROGRESSIVETOTALCREDITS:147+16=163**

*V. J. Patil*  
Head

BOS Chairman  
Department of Mechanical Engineering  
Tulsiramji Gaikwad Patil College of  
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*Amr*

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Program: Mechanical Engineering

## List of Electives offered by Mechanical Engineering Professional Elective

Professional Elective-I	Professional Elective-II	Professional Elective-III	Professional Elective-IV	Professional Elective-V
<b>Semester V BME3507</b>	<b>Semester V BME3511</b>	<b>Semester VI BME3607</b>	<b>Semester VI BME3611</b>	<b>Semester VII BME4706</b>
BME3507:Power Plant Engineering	BME3511:Renewable Energy System	BME3607: Mechanical Measurement and metrology	BME3611:Industrial Fluid Power	BME4705:StressAnalysis
BME3508:Computer Aided Designing	BME3512:Control System Engineering	BME3608:Mechanical Vibrations	BME3612:Finite Element Analysis	BME4706:Material Handling System
BME3509:Advance Manufacturing Techniques	BME3513:Tool Design	BME3609:Industrial Robotics	BME3613:AutomotiveSystem	BME4707:Composite Material
BME3510:Production Management	BME3514:Industrial Engineering	BME3610:Operation Research	BME3614:Product Design and Development	BME4708:Total Quality Management

## Open Elective

<b>List of Open Elective</b>					
Sr. No.	Course Code	Course Title	Sr .No.	Course Code	Course Title
1	BCSXX01	Cyber Law and Ethics	9	BMEXX09	Additive Manufacturing Techniques
2	BCSXX02	Block chain Technology	10	BMEXX10	Automobile Engineering
3	BITXX03	Cyber Security	11	BEEXX11	Power Plant Engineering
4	BITXX04	Artificial Intelligence	12	BEEXX12	Electrical Materials
5	BECXX05	Internet of Things	13	BAEXX13	Avionics
6	BECXX06	Embedded Systems	14	BAEXX14	Unmanned Aerial Vehicles
7	BCEXX07	Introduction to Art and Aesthetics	15	BBTXX15	Biomaterials
8	BCEXX08	Metro Systems and Engineering	16	BBTXX16	Food and Nutrition Technology



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**Fourth Year (Semester-VII) B. Tech. Mechanical Engineering**

**BME4701: Refrigeration and Air Conditioning**

Teaching Scheme		Examination Scheme	
Lecture	4 Hrs/Week	CT-1	15 Marks
Tutorial	-	CT-2	15 Marks
Total Credit	4	TA	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of Exam: 03 Hrs .	

**Course Objectives**

1	Students will learn different refrigeration processes.
2	To learn about various compound refrigeration and multi evaporation system
3	To understand air refrigeration system.
4	To examine different cryogenic processes.
5	To solve different heat load calculation

**Course Contents**

**CO**

<b>Unit I</b>	<b>Refrigeration:</b> Introduction, unit of refrigeration, analysis of simple vapour compression refrigeration system, effect of sub cooling, superheating on coefficient of performance. Study of Vapour Absorption Refrigeration System: Aqua Ammonia, Lithium Bromide- Water system, Refrigerants – Properties, classification, nomenclature, its global warming & ozone depletion potential, montreal protocol, kyoto protocol, alternate refrigerants.	<b>CO1</b>
<b>Unit II</b>	Compound vapour compression refrigeration system, multiple evaporator system, types of compressor, condenser, evaporator, expansion devices, hermetic compressors, methods of defrosting.	<b>CO2</b>
<b>Unit III</b>	<b>Air cycle refrigeration:</b> Air cycle refrigeration & its application, types of air refrigeration system, vortex tube, thermoelectric refrigeration, steam jet refrigeration. (Analytical treatment is expected on air refrigeration system).	<b>CO3</b>
<b>Unit IV</b>	<b>Cryogenics:</b> Introduction, application of cryogenics, cascade system, Joules Thomson coefficient, inversion curve, methods of liquefaction of air with analytical treatment.	<b>CO4</b>
<b>Unit V</b>	<b>Advanced Psychrometric &amp; Heat Load Calculations:</b> Introduction to psychrometric properties and processes of air. Classification of air conditioning systems, Applications of psychrometry to various air conditioning systems, RSHF, ESHF, GSHF, air washers, air coolers.	<b>CO5</b>

**Text Books**

1	Refrigeration and Air Conditioning, R.S.Khurmi, S.Chand and Company.
2	Refrigeration and Air Conditioning, Arora and Domkundwar, Dhanpat Rai
3	Refrigeration and Air Conditioning, Arora C P, Tata McGraw Hill.
<b>Reference Books</b>	
1	Principles of Refrigeration, Roy Dossat, Pearson Education.
2	Commercial Refrigeration, Edwin P. Anderson, Taraporevala Sons & Co.
3	ASHRAE Hand Books, Air Conditioning Engineers
<b>Useful Links</b>	
1	<a href="https://archive.nptel.ac.in/courses/112/107/112107208/">https://archive.nptel.ac.in/courses/112/107/112107208/</a>
2	<a href="https://archive.nptel.ac.in/courses/112/105/112105129/">https://archive.nptel.ac.in/courses/112/105/112105129/</a>
3.	<a href="https://archive.nptel.ac.in/courses/112/105/112105128/">https://archive.nptel.ac.in/courses/112/105/112105128/</a>

<b>BME4701</b>	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BME4701.1</b>	<b>Calculate</b> Coefficient of Performance by using the Simple vapour compression Refrigeration System	4	9
<b>BME4701.2</b>	<b>Calculate</b> Coefficient of Performance by using the compound vapour compression Refrigeration and multiple evaporator System	3	9
<b>BME4701.3</b>	<b>Illustrate</b> concept of different Air cycle refrigeration system	4	9
<b>BME4701.4</b>	<b>Illustrate</b> the concept Cryogenics and its different types	4	9
<b>BME4701.5</b>	<b>Calculate</b> Heat Load for Air conditioning system	3	9

  
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**Fourth Year ( Semester VII) B.Tech Mechanical Engineering**

**BME4702: Additive Manufacturing 3D Printing**

<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory</b>	3Hrs/Week	<b>CT-I</b>	15 Marks
<b>Tutorial</b>	-	<b>CT-II</b>	15 Marks
<b>Total Credits</b>	<b>3</b>	<b>CA</b>	10 Marks
		<b>ESE</b>	60 Marks
		<b>Total Marks</b>	<b>100 Marks</b>
		<b>Duration of ESE: 3Hrs</b>	

**Course Objectives**

<b>1</b>	To make the students aware of rapidly evolving and widely used fabrication technology
<b>2</b>	To aware of the technology for conceptual modeling, prototyping and rapid manufacturing
<b>3</b>	To impart detailed knowledge of wide applications of Additive Manufacturing (AM) in industry and society; and in particular, key applications of AM such as rapid tooling, medical AM and rapid manufacturing
<b>4</b>	To Give students an understanding of 3D printers

**Course Contents**

<b>Unit I</b>	<b>Unit-I: Introduction to Additive Manufacturing and 3D Printing Technology</b> Development of Additive Manufacturing, Major trends shaping the evaluation of 3D printing, Technology Improvement, Process, Classification of Additive Manufacturing Systems, Advantages and Limitations, Additive V/S Conventional Manufacturing Processes.
<b>Unit II</b>	<b>Unit-II: Materials in Additive Manufacturing</b> Choosing Materials for Manufacturing, Multiple Materials, Metal AM Processes & Materials, Composite Materials, Biomaterials, Hierarchical Materials , Ceramics & Bio-ceramics, 4D Printing& Bio-Active Materials
<b>Unit III</b>	<b>Unit-III: Additive Manufacturing Equipment</b> Process Equipment- Design and process parameters, Governing Bonding Mechanism, Common Faults and Troubleshooting, Process design
<b>Unit IV</b>	<b>Unit-IV: Post Processing</b> Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements, Property Enhancements Using Non-thermal Techniques, Property Enhancements Using Thermal Techniques
<b>Unit V</b>	<b>Unit-V: Applications and Examples</b> Application - Material Relationship, Applications in Design, Applications in Engineering, Analysis and Planning, Applications in Manufacturing and Tooling, Applications in Aerospace Industry, Applications in Automotive Industry, Applications in Jeweler Industry, Applications in Arts and Architecture.

<b>Text Books</b>	
T.1	Additive Manufacturing and 3D Printing Technology: Principles and Applications, Dr. G.K. Awari, Dr.D.P.Kothari, Prof. Vishwjeet Ambade, Dr. C. S. Thorat, CRC Press, Taylor & Francis Group
T.2	Additive Manufacturing Technologies 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing , Ian Gibson • David Rosen • Brent Stucker, Springer New York Heidelberg DordrechtLondon
T.3	Additive Manufacturing Innovations, Advances, and Applications , t.S. Srivatsan • t.S. Sudarshan,CRC Press, Taylor & Francis Group
<b>Reference Books</b>	
R.1	Understanding Additive Manufacturing Rapid Prototyping · Rapid Tooling · Rapid Manufacturing Andreas Gebhardt, Hanser Publishers, Munich Hanser Publications, Cincinnati
R.2	Additive Manufacturing of Metals: The Technology, Materials, Design and Production , Li Yang Keng Hsu • Brian Baughman Donald Godfrey • Francisco Medina Mamballykalathil Menon SoerenWiener, Springer Series in Advanced Manufacturing
<b>Useful Links</b>	
1	<a href="https://onlinecourses.nptel.ac.in/noc21_me115/preview">https://onlinecourses.nptel.ac.in/noc21_me115/preview</a>
2	<a href="https://onlinecourses.nptel.ac.in/noc20_me50/preview">https://onlinecourses.nptel.ac.in/noc20_me50/preview</a>

<b>Course Code</b>	<b>Course Outcomes</b>	<b>BT level</b>	<b>Class Sessions</b>
<b>BME4702</b>			
<b>BME4702.1</b>	<b>Identify</b> the Different 3D printing Technology and machines used in Additive manufacturing.	4	9
<b>BME4702.2</b>	<b>Categorize</b> and Select suitable Material for printing.	4	9
<b>BME4702.3</b>	<b>Categorize</b> and Select the different equipments in Additive manufacturing	4	9
<b>BME4702.4</b>	<b>Illustrate</b> the concept of Post processing	3	9
<b>BME4702.5</b>	<b>Illustrate</b> applications of Additive manufacturing	3	9
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p><i>Head</i></p> <p>Department of Mechanical Engineering Tulsiramji Gaikwad Patil College of Engineering &amp; Technology. NAGPUR</p> </div> <div style="text-align: center;"> <p><i>Amr</i></p> <p>Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology. Nagpur</p> </div> </div>			



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**Fourth Year (Semester-VII) B. Tech. Mechanical Engineering**

**BME4703: Lab-Refrigeration and Air Conditioning**

Teaching Scheme			Examination Scheme	
Practical	2 Hrs/week		CA	25 Marks
			ESE	25 Marks
Total Credit	1		Total	50 Marks
		Duration of Exam: 03 Hrs .		

**Course Objectives**

1	Student will able to learn different types of Compressors.
2	Students understand significance of various Coontrols used in Refrigeration
3	To Examine COP of Windows Air Conditioning system
4	To learn different parameters of using Vapour Compression system
5	To perform experiment on different characteristics of Desert Cooler

Experiment No.	Name of Experiment	CO
1	<b>Explore</b> the importance of various types of Compressors.	CO1
2	<b>Explore</b> the significance of various Condensers, Evaporators, and Expansion Devices used in Refrigeration and Air Conditioning system.	CO1
3	<b>Demonstrate</b> the various types of controls used in Refrigeration and Air Conditioning system.	CO2
4	<b>Examination</b> of various components of house hold Refrigerator	CO2
5	<b>Examination</b> of various parts of Windows Air Conditioning system.	CO3
6	<b>Calculation</b> of capacity and COP of Windows Air Conditioning system.	CO3
7	<b>Iterations</b> on summer air-conditioning test rig for temperature variations.	CO3
8	<b>Demonstrate</b> an experiment on winter air-conditioning test rig.	CO3
9	<b>Evaluation</b> of parameters using Vapour Compression system.	CO4
10	<b>Evaluation</b> of performance characteristics of Desert Cooler.	CO5

**Text Books**

1	Refrigeration and Air Conditioning, R.S.Khurmi, S.Chand and Company.
2	Refrigeration and Air Conditioning, Arora and Domkundwar, Dhanpat Rai
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2	Commercial Refrigeration, Edwin P. Anderson, Taraporevala Sons & Co.
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2	<a href="https://archive.nptel.ac.in/courses/112/105/112105129/">https://archive.nptel.ac.in/courses/112/105/112105129/</a>

<b>BME4703</b>	<b>Course Outcomes</b>	<b>CL</b>	<b>Lab Sessions</b>
<b>BME4703.1</b>	Demonstrate various types of Compressor sand Paraphrasing the condenser, evaporators and expansion devices used in refrigeration system.	3	2
<b>BME4703.2</b>	Interpret the various controls used in refrigeration and air conditioning system.	3	2
<b>BME4703.3</b>	Execute the performance of various types of air conditioning system	4	2
<b>BME4703.4</b>	Evaluate the performance of the cooling capacity of the refrigeration system	3	2
<b>BME4703.5</b>	Evaluate the performance of desert cooler system	3	2

  
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**Fourth Year (Semester-VII) B. Tech. Mechanical Engineering**

**BME4707: PE-V- Material Handling System**

Teaching Scheme			Examination Scheme	
Lectures	4 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	4		TA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03 Hrs .		

**Course Objectives**

1	To understand the basic concepts of materials handling
2	To analyze Selection of Material Handling Equipments
3	To design of Mechanical Handling Equipments
4	To choose equipments used for Material Storage

**Course Contents**

<b>Unit I</b>	<b>Elements of Material Handling System:</b> -Importance, terminology, objectives and benefits of better Material Handling; Principles and features of Material Handling System; Interrelationships between material handling and Plant layout, physical facilities and other organizational functions; Classification of Material Handling equipments. Selection of Material Handling Equipment: Classifications & Attributes
<b>Unit II</b>	<b>Selection of Material Handling Equipments:-</b> Factors affecting for selection; Material Handling equation; choices of Material Handling equipment; general analysis procedures; basic analytical techniques; the unit load concept; selection of suitable types of systems for applications; activity cost data and economic analysis for design of components of Material Handling Systems; functions and parameters affecting service; packing and storage of materials.High quality design system
<b>Unit III</b>	<b>Design of Mechanical Handling Equipments:-</b> [A] Design of Hoists: - Drives for hoisting, components, and hoisting mechanisms; rail traveling components and mechanisms; hoisting gear operation during transient motion; selecting the motor rating and determining breaking torque for hoisting mechanisms. [B] Design of Cranes:- Hand-propelled and electrically driven EOT overhead traveling cranes; Traveling mechanisms of cantilever and monorail cranes; design considerations for structures of rotary Cranes with fixed radius; fixed post and overhead traveling cranes; Stability of stationary Rotary and traveling rotary cranes. Analysis of material handling equipment using software
<b>Unit IV</b>	<b>Design of load lifting attachments:-</b> Load chains and types of ropes used in Material Handling System; Forged, Standard and Ramshorn Hooks; Crane Grabs and Clamps; Grab Buckets; Electromagnet; Design consideration for conveyor belts; Application of attachments. Design specification for fully automated system.
	<b>Material Storage and Safety considerations:-</b> Objectives of storage; Bulk material handling;

<b>Unit V</b>	Gravity flow of solids through slides and chutes; Storage in bins and hoppers; Belt conveyors; Bucket-elevators; Screw conveyors; Vibratory Conveyors; Cabin conveyors; Mobile racks etc. Safety and design, Safety regulations and discipline, material handling safety with health
<b>Text Books</b>	
1	Aspects of Materials Handling, Arora, K. & Shinde, V., University Science Press
2	Material Handling Equipments, N. Rudenko, Peace Publishers.
<b>Reference Books</b>	
1	Bulk Solid Handling, C. R. Cock and J. Mason, Leonard Hill Publication Co. Ltd.
2	Material Handling Hand Book, Kulwiac R. A., John Wiley Publication.
<b>Useful Links</b>	
1	<a href="https://nptel.ac.in/courses/112/107/112107142/">https://nptel.ac.in/courses/112/107/112107142/</a>
2	<a href="https://nptel.ac.in/content/storage2/courses/">https://nptel.ac.in/content/storage2/courses/</a>

Course Code	Course Outcomes	CL	Class Sessions
<b>BME4707</b>			
<b>BME4707.1</b>	<b>Understand</b> importance of material handling in a plant	2	9
<b>BME4707.2</b>	<b>Demonstrate</b> the understanding of mechanism and working of various materials handling systems.	5	9
<b>BME4707.3</b>	<b>Analyze</b> design components of material handling systems	4	9
<b>BME4707.4</b>	<b>Understand</b> equipments used for Material Storage	2	9
<b>BME4707.5</b>	<b>Estimate</b> Safety and design for material handling system	5	9
<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <p>Department of <sup>Head</sup> Mechanical Engineering Tulsiramji Gaikwad Patil College of Engineering &amp; Technology, NAGPUR</p> </div> <div style="text-align: center;"> <p>Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur</p> </div> </div>			



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**Fourth Year (Semester-VII) B. Tech. Mechanical Engineering**

**BME4709: PE-V- Total Quality Management**

Teaching Scheme			Examination Scheme	
Lectures	4 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	4		TA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03 Hrs .		

**Course Objectives**

1	To give the students an overview of quality and TQM and explaining the salient contributions of Quality Gurus like Deming, Juran and Crosby. General barriers in implementing TQM.
2	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes
3	To facilitate the understanding of Quality Management principles and process.

**Course Contents**

<b>Unit I</b>	<b>Unit I —Introduction to Total Quality Management</b> Concept of Quality, Need for Quality. Definition of Quality Dimensions of a Product and Quality of Service, Concept of TQM, Framework of TQM. Contributions of Deming, Juran, and Crosby, benefits and challenges of implementing TQM in various industries.
<b>Unit II</b>	<b>Unit II— Principles of Total Quality Management</b> Continuous process improvement • PDCA cycle, Kaizen, 8D Methodology. Supplier partnership, Supplier Rating. Strategies for involving employees and suppliers in continuous improvement initiatives. Taguchi technique— Introduction, Loss Function, Parameter, and Tolerance Design, Signal to Noise ratio.
<b>Unit III</b>	<b>Unit III — Statistical Process Control and Process Capability</b> Statistical Process Control- Central Tendency, Normal curve, Control Charts, Statistical tools and techniques to assess and improve process capability. Process Capability, Quality Function Development (QFD), TPM - Concepts, improvement.
<b>Unit IV</b>	<b>Unit IV - Tools and Techniques in Total Quality Management</b> The seven traditional tools of quality, measure and evaluate the effectiveness of TQM tools, New management tools, Six-sigma: Concepts, Methodology, Applications to Manufacturing, and Service Sector including IT. FMEA Stages and Types.
<b>Unit V</b>	<b>Unit V — Quality Systems in Total Quality Management</b> Introduction to IS/ISO 9004:2000. Quality Management Systems, Guidelines for performance improvements, Quality Audits, knowledge of quality systems, audits, leadership, and software tools to real-world case studies and scenarios., Leadership and Quality Council, Employee Involvement in TQM, Motivation, Empowerment, Recognition and reward,

	Overview software used for TOM.
<b>Text Books</b>	
1	A textbook of Methods of Total Quality Management by Himalaya Publishing House.
2	A textbook of quality control and total quality management by Tata Mccraw Hill.
3	A textbook essence of total quality management by prentice hall of India.
<b>Reference Books</b>	
1	Total Quality Management:Naidu, Nvr ; New Delhi : New Age International, 2006.
2	Total Quality Management:S D Bagade ;Mumbai : Himalaya Publishing House, 2011
<b>Useful Links</b>	
1	<a href="https://archive.nptel.ac.in/courses/110/104/110104080/">https://archive.nptel.ac.in/courses/110/104/110104080/</a>
2	<a href="https://archive.nptel.ac.in/courses/110/104/110104085/">https://archive.nptel.ac.in/courses/110/104/110104085/</a>
3	<a href="https://elearn.nptel.ac.in/shop/nptel/total-quality-management-i/">https://elearn.nptel.ac.in/shop/nptel/total-quality-management-i/</a>

Course Code	Course Outcomes	CL	Class Sessions
<b>BME4709</b>			
<b>BME4709.1</b>	<b>Analyze</b> the benefits and challenges of implementing TQM in various industries and sectors.	4	9
<b>BME4709.2</b>	<b>Summarize</b> strategies for involving employees and suppliers in continuous improvement initiatives.	5	9
<b>BME4709.3</b>	<b>Apply</b> statistical tools and techniques to assess and improve process capability.	3	9
<b>BME4709.4</b>	<b>Summarize</b> the effectiveness of TQM tools in achieving quality objectives and organizational goals.	5	9
<b>BME4709.5</b>	<b>Apply</b> knowledge of quality systems, audits, leadership, and software tools to real-world case studies and scenarios.	3	9

  
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**Fourth Year (Semester-VIII) B. Tech. Mechanical Engineering**

**BME4802: Project Management**

Teaching Scheme			Examination Scheme	
Lectures	3 Hrs/week		CT-1	15 Marks
Tutorial	-		CT-2	15 Marks
Total Credit	3		TA	10 Marks
			ESE	60 Marks
		Total	100 Marks	
		Duration of ESE: 03 Hrs .		

**Course Objectives**

1	Analyze the principles of project management, emphasizing project selection and feasibility studies.
2	Analyze and apply principles of project planning and implementation.
3	Apply project management principles to establish and maintain effective project monitoring and control.
4	Demonstrate the ability to critically evaluate and execute project closure processes.
5	Apply knowledge of computer technologies and e-markets to enhance project management, integrating risk management and environmental impact assessment.

**Course Contents**

<b>Unit I</b>	<b>INTRODUCTION TO PROJECT MANAGEMENT AND PROJECT SELECTION</b> Objectives of Project Management- Importance of Project Management- Types of Projects Project Management Life Cycle- Project Selection – Feasibility study: Types of feasibility Steps in feasibility study.
<b>Unit II</b>	<b>PROJECT PLANNING AND IMPLEMENTATION</b> Project Scope- Estimation of Project cost – Cost of Capital – Project Representation and Preliminary Manipulations - Basic Scheduling Concepts - Resource Levelling – Resource Allocation.
<b>Unit III</b>	<b>PROJECT MONITORING AND CONTROL</b> Setting a base line- Project management Information System – Indices to monitor progress. Importance of Contracts in projects- Teamwork in Project Management - Attributes of a good project team – Formation of effective teams – stages of team formation.
<b>Unit IV</b>	<b>PROJECT CLOSURE</b> Project evaluation- Project Auditing – Phases of project Audit- Project closure reports Guidelines for closeout reports.
<b>Unit V</b>	<b>SPECIAL TOPICS IN PROJECT MANAGEMENT</b> Computers, e-markets and their role in Project management- Risk management, Environmental Impact Assessment. Case studies in Project management.

<b>Text Books</b>	
1	Project Management, Khanna, R. B. (2011), PHI Learning Private Limited, New Delhi
2	Chandra, P., Projects, Tata McGraw-Hill Education, 2009, ISBN: 0070077932   ISBN: 978007007793
3	"Project Management: A Systems Approach to Planning, Scheduling, and Controlling" by Harold Kerzner, published by Wiley.
4	Lewis, R., Project Management, McGraw-Hill, 2006, ISBN 0-07-147160-X.
<b>Reference Books</b>	
1	"A Guide to the Project Management Body of Knowledge (PMBOK Guide)" by Project Management Institute (PMI), published by PMI
2	Project Management Essentials You Always Wanted To Know (Self-Learning Management Series) by Vibrant Publishers and Kalpesh Ashar   20 January 2022
<b>Useful Links</b>	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_mg30/preview">https://onlinecourses.nptel.ac.in/noc19_mg30/preview</a>
2	<a href="https://archive.nptel.ac.in/courses/110/104/110104073/">https://archive.nptel.ac.in/courses/110/104/110104073/</a>
3	<a href="https://onlinecourses.nptel.ac.in/noc23_mg124/preview">https://onlinecourses.nptel.ac.in/noc23_mg124/preview</a>

<b>BME4802</b>	<b>Course Outcomes</b>	<b>CL</b>	<b>Class Sessions</b>
<b>BME4802.1</b>	<b>Apply</b> project management principles to assess and select projects.	3	9
<b>BME4802.2</b>	<b>Evaluate</b> project scopes, estimate costs, and determine cost of capital.	3	9
<b>BME4802.3</b>	<b>Demonstrate</b> the ability to set project baselines for effective monitoring and control	3	9
<b>BME4802.4</b>	<b>Analyze</b> and assess project performance using project auditing methods.	3	9
<b>BME4802.5</b>	<b>Analyze</b> and evaluate the role of computers and e-markets in project management.	3	9

  
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**Fourth Year (Semester-VIII) B. Tech. Mechanical Engineering**

**BAU4808: PROJECT BASED SCIENCE, TECHNOLOGY, SOCIAL DESIGN  
AND INNOVATION**

Teaching Scheme			Examination Scheme	
Lectures	2 Hrs/week		CT-1	-
Tutorial	-		CT-2	-
Total Credit	Audit		TA	-
			ESE	-
		Total	-	
		Duration of ESE:	-	

**Course Objectives**

1	To explain the concept of design thinking for product and service development
2	To explain the fundamental concept of innovation and design thinking
3	To discuss the methods of implementing design thinking in the real world..

**Course Contents**

<b>Unit I</b>	<b>Process Of Design</b> Understanding Design thinking Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping
<b>Unit II</b>	<b>Tools for Design Thinking Real-Time</b> design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design.
<b>Unit III</b>	<b>Design Thinking in IT Design Thinking to Business Process modelling</b> – Agile in Virtual collaboration environment – Scenario based Prototyping.
<b>Unit IV</b>	<b>DT For strategic innovations Growth</b> – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design
<b>Unit V</b>	<b>Design Thinking</b> by Ideate, Prototype and Test, identify problem areas, and synthesize the gathered information & define social design opportunities.

**Text Books**

1	A textbook of Machine design by S. Chand and CO.
2	A textbook of Machine design by Eurasia Publishing House (Pvt.) Ltd.
3	A textbook of Computer-Aided Design And Manufacturing by Pearson Education

**Reference Books**

1	Analysis And Design Algorithms: Guruprasad,N: S.Chand And Co
2	Cad/Cam : Computer Aided Design And Manufacturing: Groover Mikell P; Zimmers Emory W; Pearson Education.



Useful Links	
1	<a href="https://onlinecourses.nptel.ac.in/noc19_mg60/preview">https://onlinecourses.nptel.ac.in/noc19_mg60/preview</a>
2	<a href="https://archive.nptel.ac.in/courses/107/101/107101088/">https://archive.nptel.ac.in/courses/107/101/107101088/</a>
3	<a href="https://onlinecourses.nptel.ac.in/noc22_de16/preview">https://onlinecourses.nptel.ac.in/noc22_de16/preview</a>

BAU4808	Course Outcomes	CL	Class Sessions
BAU4808.1	Summarize different methodologies and approaches used in the design process	5	9
BAU4808.2	Summarize generation of design ideas through different technique	5	9
BAU4808.3	Interpret the significance of reverse Engineering to Understand products	3	9
BAU4808.4	Discuss technical drawing for design ideas.	5	9
BAU4808.5	Apply design principles and methodologies to analyze and synthesize the gathered information, identify problem areas, and define social design opportunities.	3	9

  
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