ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)
RAJAMPET, Annamayya District, AP – 516126, INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

MEETING MINUTES
of
THIRD BOARD OF STUDIES

ACADEMIC YEAR: 2026-27

Date & Time: 02/05/2026 & 10:30AM
Venue: CAD/CAM Laboratory, ME Block

ANNAMACHARYA UNIVERSITY

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Ref. No.:/AU/SoE/ME/BOS-03/2026-27/MOM-03 Date: 02/05/2026

DEPARTMENT OF MECHANICAL ENGINEERING

3rd BoS Minutes of Meeting

The 3rd meeting of Board of Studies (BoS) for Department of Mechanical Engineering is held in offline mode on 5th May, 2026 in Room No. 102, CAD/CAM laboratory of Mechanical Engineering Block at 10:30 AM in the presence / absence of the following members of the board.

Members of Presence:

S.N	Name	Designation	Status
1	Dr. G. Suresh Babu	Head of the Department, Mechanical Engineering Department Annamacharya University, Rajampet. Ph: 9866632446 Email: hodme@annamacharyauniversity.edu.in	Chairman
2	Dr N. Sivarami Reddy	Professor, Mechanical Engineering Department Annamacharya University, Rajampet. Ph: 9848998645, Email: aits.med.nsrr@gmail.com	Senior Faculty – Member
3	Mr. B Santhosh Kumar	Assistant Professor Mechanical Engineering Department Annamacharya University, Rajampet. Ph: 9000916658, Email: aits.med.bsk@gmail.com	Course Coordinator-Member
4	Mr Ajay Kumar Reddy K	Assistant Professor Mechanical Engineering Department Annamacharya University, Rajampet. Ph: 9703926212, Email: aits.med.kakr@gmail.com	Course Coordinator-Member
5	Dr Anil Kumar E	Professor, Dept. of Mechanical Engineering, Indian Institute of Technology (IIT) Tirupati Ph: 7879779188, Email: anil@iittp.ac.in	Subject Expert – Member
6	Dr V Diwakar Reddy	Professor & Head, Dept. of Mechanical Engineering SVU College of Engineering, Tirupati Ph: 9440088282,Email:diwakarreddy@svumail.edu.in	Subject Expert – Member
7	Dr B Durga Prasad	Professor, Dept. of Mechanical Engineering JNTUA College of Engineering, Ananthapuramu Ph: 9441074399, Email: durga.mech@jntua.ac.in	University Nominee-Member
8	Mr S Veeranjaneyulu	Head – Sales & Business Development, Pennar Industries Limited – Railways & Aerospace, Patancheruvu, Hyderabad Ph: 7799597874, Email: veera.s@pennarindia.com	Industry Representative – Member
9	Mr S Bala Krishna	Technical Support Engineer (L3), Microsoft, Bengaluru Ph: 9573572923 Email: bsurimisetty@microsoft.com	Alumni Representative - Member

Members of Absence: ONE

Encl: Attendance sheet of the meeting with members' signature

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RAJAMPET, Annamayya District, AP-516126, INDIA

Department of Mechanical Engineering

Board of Studies (BoS) Meeting – Attendance Sheet

Date: 02.05.2026
Time: 10:00 AM
Venue: CAD/CAM Lab, Department of Mechanical Engineering

Attendance of Members

S. No.	Name & Contact Details	Role in BoS	Signature with Date
1	**Dr. G. Suresh Babu** Head, Dept. of Mechanical Engineering, Annamacharya University, Rajampet Ph: 9866632446 Email: hodme@annamacharyauniversity.edu.in	Chairman	2/5/26
2	**Dr. N. Sivarami Reddy** Professor & Dean R&D, Dept. of Mechanical Engineering, Annamacharya University, Rajampet Ph: 9848998645 Email: aits.med.nsrr@gmail.com	Senior Faculty Member	02/5/26
3	**Mr. B. Santosh Kumar** Assistant Professor, Dept. of Mechanical Engineering, Annamacharya University, Rajampet Ph: 9000916658 Email: aits.med.bsk@gmail.com	Course Coordinator – Member	2/5/26
4	**Mr. K. Ajay Kumar Reddy** Assistant Professor, Dept. of Mechanical Engineering, Annamacharya University, Rajampet Ph: 9703926212 Email: aits.med.kakr@gmail.com	Course Coordinator – Member	2/5/26
5	**Dr. Anil Kumar E** Professor, Dept. of Mechanical Engineering, Indian Institute of Technology (IIT) Tirupati Ph: 7879779188 Email: anil@iittp.ac.in	Subject Expert – Member	ABSENT
6	**Dr. V. Diwakar Reddy** Professor & Head, Dept. of Mechanical Engineering SVU College of Engineering, Tirupati Ph: 9440088282 Email: diwakarreddy@svumail.edu.in	Subject Expert – Member	02-5-26
7	**Dr. B. Durga Prasad** Professor, Dept. of Mechanical Engineering JNTUA College of Engineering, Ananthapuramu Ph: 9441074399 Email: durga.mech@jntua.ac.in	University Nominee – Member	Attended Online
8	**Mr. S. Veeranjaneyulu** Head – Business Development, Pennar Aerospace Division, Hyderabad Ph: 7799597874 Email: veera.s@pennarindia.com	Industry Representative – Member	02/05/26
9	**Mr. S. Bala Krishna** Technical Support Engineer (L3), Microsoft, Bengaluru Ph: 9573572923 Email: bsurimisetty@microsoft.com	Alumni Representative – Member	02/05/26

Chairperson – BoS
Department of Mechanical Engineering

Agenda of the Meeting:

Item No	Particulars
BoS/2026/MECH/3.1	Confirmation of the Minutes of the previous 2nd BoS Meeting held on 09.06.2025
BoS/2026/MECH/3.2	To discuss and finalise the course structure of III & IV Year Mechanical Engineering under AU-24 Regulations and to deliberate in detail on the syllabus of III Year courses.
BoS/2026/MECH/3.3	Review of the curriculum with respect to industry requirements and emerging technologies.
BoS/2026/MECH/3.4	Inclusion of skill-oriented, value-added, and interdisciplinary courses.
BoS/2026/MECH/3.5	Discussion on integration of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) and Cross-cutting issues, in the curriculum
BoS/2026/MECH/3.6	Approval of the list of examiners for various courses.
BoS/2026/MECH/3.7	Discussion on introduction of new programs / enhancement of intake, if any.
BoS/2026/MECH/3.8	Any other item with the permission of the Chair.

Encl: HOD Circular dated 27.04.2026

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RAJAMPET, Annamayya District, AP-516126, INDIA

Department of Mechanical Engineering

Date: 27.04.2026

CIRCULAR

With reference to the Registrar's Circular dated 11.04.2026 regarding the conduct of Board of Studies (BoS) meetings, the **3rd Board of Studies (BoS) Meeting** for **AU-24 Regulations – B.Tech. Mechanical Engineering** is scheduled as follows:

Date: 02.05.2026
Time: 10:30 AM
Venue: CAD/CAM Lab, Department of Mechanical Engineering

Agenda for Discussion

1. Confirmation of the Minutes of the previous 2nd BoS Meeting held on 09.06.2025.
2. To discuss and finalise the course structure of III & IV Year Mechanical Engineering under AU-24 Regulations and to deliberate in detail on the syllabus of III Year courses.
3. Review of the curriculum with respect to industry requirements and emerging technologies.
4. Inclusion of skill-oriented, value-added, and interdisciplinary courses.
5. Discussion on integration of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) and Cross-cutting issues, in the curriculum.
6. Approval of the list of examiners for various courses.
7. Discussion on introduction of new programs / enhancement of intake, if any.
8. Any other item with the permission of the Chair.

All the members of the Board of Studies are requested to participate actively in the discussions.

Dr. G. Suresh Babu
Head of the Department & Chairperson – BoS
Department of Mechanical Engineering
Annamacharya University, Rajampet

ANNAMACHARYA UNIVERSITY

(Estd. under AP Private Universities (Establishment and Regulation) Act, 2016)
(University listed in UGC as per the section 2(f) of the UGC Act, 1956)
RAJAMPET, YSR Kadapa District, AP – 516126, INDIA

Lr. No: Registrar's Office /Circular/April/09/2026 Date: 11.04.2026

CIRCULAR

By the direction of the Vice-Chancellor, it is hereby informed that the Board of Studies meetings for the School of Engineering, School of Management, School of Sciences, College of Agriculture, College of Allied Health Sciences, College of Law, and College of Pharmacy are scheduled as follows:

SNo.	Name of the Department	Meeting Scheduled
1	Master of Business Administration / BBA	**28.04.2026**
2	Mechanical Engineering	**02.05.2026**
3	Electronics and Communication Engineering	**02.05.2026**
4	Computer Science and Engineering / CSE (Artificial Intelligence and Machine Learning) / CSE (IOT and Cyber Security Including Block Chain Technology)	**02.05.2026**
5	Artificial Intelligence and Data Science / CSE (Data Science)	**02.05.2026**
6	Artificial Intelligence and Machine Learning / CSE (Artificial Intelligence)	**02.05.2026**
7	School of Health Sciences	**02.05.2026**
8	Civil Engineering	**05.05.2026**
9	Electrical and Electronics Engineering	**06.05.2026**
10	School of Agriculture	**06.05.2026**
11	School of Law	**06.05.2026**
12	H&S (Humanities and Sciences)	**07.05.2026**
13	Master of Computer Applications / U G - SCIENCES	**08.05.2026**
14	School of Pharmacy	**08.05.2026**

All Chairpersons of the Boards of Studies are requested to conduct the meetings strictly as per the schedule. The minutes of the meeting shall be submitted in hard copy to the Dean (Academics) and in soft copy to the undersigned within one week from the date of the BoS meeting. All Heads of Departments are required to communicate the venue of the meeting at least three days in advance, as per the schedule mentioned above. Further, all members must sign on every page of the minutes without fail.

ANNAMACHARYA UNIVERSITY ★ VIDYAN SARVATRA PUJYATHE ★

REGISTRAR

Copy to: The Chancellor's office
Copy to: PA to Vice Chancellor
Copy to: The Principal, AITS | ANCP
Copy to: The Dean, Academics | Agriculture
Copy to: Heads of the Departments – Civil | EEE | ME | ECE | CSE | AIDS | AIML | CSE (AI) | CSE (DS) | CSE (AIML) | CSE(IoTCSBCT) | H&S | MBA | MCA
Copy to: Officer In-Charge, UG Sciences | Health Sciences | Law
Copy to: Controller of Examinations | Administrative Officer | Finance Officer
Copy to: Registrar office, for file

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MINUTES OF THE MEETING

Agenda Item No. BoS/2026/MECH/3.1: Confirmation of the Minutes of the 2nd Board of Studies Meeting.

- The Chairman of Board of Studies informed the members that the minutes of the 2nd Board of Studies meeting of the Department of Mechanical Engineering, School of Engineering, Annamacharya University, held on 9th June 2025, were circulated to all members through email for review and confirmation.

Resolution:

The Board of Studies members confirmed and approved the Minutes of the 2nd Board of Studies meeting held on 9th June 2025. The Minutes of Meeting and Action Taken Report are enclosed in **Annexure – I.**

Agenda Item No. BoS/2026/MECH/3.2: To discuss and finalise the course structure of III & IV Year Mechanical Engineering under AU-24 Regulations and to deliberate in detail on the syllabus of III Year courses.

- Dr G. Suresh Babu presented initially the III-Year course structure and syllabi to the members. The following discussions were made.
  1. Machining Processes: Dr. V. Diwakar Reddy suggested adding the textbook Tool Design by Donaldson Cyril in the reference section.
  2. I.C. Engines & Gas Turbines: Dr. V. Diwakar Reddy suggested adding the textbook Treatise on Heat Engineering by V. P. Vasandani in the reference section.
  3. Design of Machine Members: Dr. V. Diwakar Reddy suggested revising Unit-II by limiting the topic "Design of Springs" to helical and leaf springs with simple problems only. He also suggested removing gasketed joints from Unit-III and deleting the repeated topics related to torsion and leaf spring design from Unit-II.
  4. Renewable Energy Resources: Dr. B. Durga Prasad and Mr. S. Veeranjaneyulu suggested revising the title of Unit-V as "Tidal, Wave, Hydro and Direct Energy Conversion Systems".
  5. Mechanical Vibrations: Dr. B. Durga Prasad suggested revising the syllabus of Unit-I with cross verification of the topics covered in the Theory of Machines subject.
  6. Mechanical Vibrations: Dr. V. Diwakar Reddy suggested to add in the reference section: Mechanical Vibrations by W. T. Thomson & Mechanical Vibrations by V. P. Singh
  7. Machining Process Laboratory: Dr. V. Diwakar Reddy and Mr. S. Veeranjaneyulu suggested developing an end product utilizing the resources available in the Machining Process Laboratory.
  8. Refrigeration & Air Conditioning Lab: Dr. B. Durga Prasad and Dr. V. Diwakar Reddy suggested introducing clean air technology as a study experiment in the Refrigeration and Air Conditioning Laboratory.
  9. Refrigeration & Air Conditioning Lab: Dr. N. Sivarami Reddy suggested introducing a welding experiment in the list of experiments of the Refrigeration and Air Conditioning Laboratory.
  10. Heat Transfer: Dr. B. Durga Prasad and Dr. N. Sivarami Reddy suggested adding the topic "basic two-dimensional formulation of numerical methods under elementary treatment" in Unit-I of the Heat Transfer subject.
  11. Metrology and Measurements: Dr. V. Diwakar Reddy and Dr. N. Sivarami Reddy suggested reviewing the topics in Unit-I and recommended removing the topic "Sine Bar" as it is already covered in the laboratory.

12. Metrology and Measurements: Dr. V. Diwakar Reddy and Dr. N. Sivarami Reddy suggested specifying the methods used for pressure measurement, such as Bourdon tube and diaphragm methods.
13. CAD/CAM: Dr. V. Diwakar Reddy suggested incorporating file formats such as IGES and STEP in Unit-II and removing the topic CAQC.
14. Smart Manufacturing: Dr. V. Diwakar Reddy suggested adding network protocols in systems under the Smart Manufacturing subject. He also suggested providing exposure to NSCAD software and including a case study report on industrial techniques related to smart manufacturing.
15. Additive Manufacturing: Dr. V. Diwakar Reddy suggested the following modifications:
    i) Unit-IV and Unit-V topics are to be interchanged.
    ii) Reverse Engineering topics from Unit-IV are to be shifted to Unit-V.
16. Automobile Engineering: Dr. B. Durga Prasad and Dr. V. Diwakar Reddy suggested planning an industrial visit to understand practical aspects of automobile systems such as steering systems and related components.
17. Design of Transmission Systems: Dr. V. Diwakar Reddy suggested the following:
    i) To include Lewis equation derivation in Unit-III.
    ii) To reduce the overall syllabus content as it is lengthy.
    iii) To include elementary treatment of single web crankshaft design and force diagrams.
    iv) To add the textbooks Machine Design by Robert L. Norton and Design of Machine Members by P. Kannaiah in the reference section.
18. Modern Machining Processes: Dr. V. Diwakar Reddy suggested adding applications related to precision engineering in Unit-II and including Wire EDM principles and applications in Unit-IV.
19. Operations Research: Dr. V. Diwakar Reddy advised verifying the inclusion of North-West Corner Method and Vogel's Approximation Method in Unit-II.
20. Computational Fluid Dynamics: Dr. V. Diwakar Reddy suggested the following:
    i) To verify whether numerical methods are covered in the mathematics syllabus.
    ii) To specify prerequisites for all elective subjects.
    iii) To revise the syllabus to basic and elementary level and to avoid detailed derivations.
    iv) To restrict the number of numerical methods in Unit-V to a minimum.
21. Heat Transfer Lab: Dr. B. Durga Prasad and Dr. V. Diwakar Reddy suggested adding a study experiment on formulation of non-dimensional parameters in the Heat Transfer Laboratory.
22. Computer Aided Engineering Lab: Mr. S. Bala Krishna and Dr. V. Diwakar Reddy suggested adding experiments on axisymmetric thermal analysis in Part-III and also recommended including experiments on thermal stress and thermal strain analysis using ANSYS.
23. Mr. S. Veeranjaneyulu suggested reviewing the inclusion of surface treatment topics in the curriculum.
24. In the IV-Year course structure, Dr. V. Diwakar Reddy, Mr. S. Bala Krishna and Mr. S. Veeranjaneyulu suggested the following points related to the Product Development Laboratory:
    i) To verify the prerequisites for the course.
    ii) To verify whether Design for Manufacturing topics are already covered in the curriculum.
    iii) To provide exposure to design process, design synthesis and design specifications.
    iv) To conduct at least three exercises related to design topics

Resolution:

After detailed deliberations, the Board of Studies members unanimously approved the incorporation of the above suggestions and modifications in the III & IV Year Mechanical Engineering course structure and III Year syllabi under AU-24 Regulations. The corresponding Action Taken Report (ATR) is enclosed in **Annexure – II.**

Agenda Item No. BoS/2026/MECH/3.3: Review of the curriculum with respect to industry requirements and emerging technologies.

- The members reviewed the curriculum with respect to current industry requirements and emerging technologies. The following suggestions were made:
  1. To strengthen industry-oriented learning through inclusion of case studies, industrial applications and software exposure in core and elective subjects.
  2. To provide practical exposure to modern manufacturing technologies such as Smart Manufacturing, Additive Manufacturing, Industrial IoT, Robotics and Artificial Intelligence applications in Mechanical Engineering.
  3. To encourage interdisciplinary learning by integrating topics related to automation, data analytics, electric vehicles and sustainable engineering practices.
  4. To improve employability skills through industry visits, mini-projects, product development activities and hands-on laboratory experiments.
  5. To introduce emerging software tools and simulation platforms relevant to design, manufacturing and analysis applications.
  6. To ensure the syllabus content is balanced between theoretical concepts and practical industrial applications suitable for undergraduate students.
  7. To periodically review the curriculum and update elective subjects in line with current industrial trends and technological advancements.
  8. The members appreciated the incorporation of industry-oriented content, emerging technologies and software/tool-based learning components in the curriculum.

Resolution:

After detailed deliberations, the Board of Studies members appreciated the efforts made towards aligning the curriculum with current industry requirements and emerging technologies. The members unanimously recommended incorporating industry-oriented learning practices, interdisciplinary technologies, practical exposure, software tools and application-based learning approaches in the curriculum wherever applicable. The Board also resolved to periodically review and update the curriculum in accordance with industrial trends, technological advancements and employability requirements.

Agenda Item No. BoS/2026/MECH/3.4: Inclusion of skill-oriented, value-added, and interdisciplinary courses.

- The members discussed the inclusion of skill-oriented, value-added and interdisciplinary courses in the curriculum. The following suggestions were made:
  1. To introduce skill-oriented courses focusing on industry-relevant software tools, manufacturing practices and emerging technologies.
  2. To encourage interdisciplinary learning through courses integrating Mechanical Engineering with Artificial Intelligence, Automation, Robotics, Data Analytics and Electric Vehicle technologies.

3. To promote value-added courses aimed at improving employability, technical competency and entrepreneurial skills among students.
4. To provide certification-oriented training programs in collaboration with industries and professional bodies.
5. To include hands-on learning activities such as mini-projects, case studies, industrial training and product development exercises in laboratory courses.
6. To encourage students to undertake interdisciplinary projects addressing real-time industrial and societal problems.
7. To periodically review and update value-added and interdisciplinary course offerings based on industry requirements and technological advancements.

The members appreciated the inclusion of skill-oriented, value-added and interdisciplinary learning components aimed at improving employability, practical skills and industry readiness of students.

Resolution:

After detailed deliberations, the Board of Studies members appreciated the inclusion of skill-oriented, value-added and interdisciplinary learning components in the curriculum. The members unanimously recommended strengthening industry-oriented training, certification programs, interdisciplinary learning, project-based activities and practical skill development initiatives to enhance student employability, innovation and technical competency. The Board also resolved to periodically review and update such course offerings in line with emerging technologies, industrial requirements and future career opportunities.

Agenda Item No. BoS/2026/MECH/3.5: Discussion on integration of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) and Cross-cutting issues, in the curriculum.

- Dr. G. Suresh Babu presented the detailed course-wise mapping of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS), and cross-cutting issues integrated into the curriculum of III and IV Year Mechanical Engineering courses. The presentation included unit-wise mapping of sustainability concepts, traditional knowledge systems, environmental aspects, societal relevance, ethical practices, and interdisciplinary learning components across theory courses, laboratories, internships, and project work.
- The Board members reviewed the integration of SDGs related to clean energy, sustainable manufacturing, responsible consumption, industry innovation, quality education, climate action, gender equality, and sustainable communities through various core and elective courses. The members appreciated the inclusion of topics related to renewable energy systems, green manufacturing, smart manufacturing, energy-efficient systems, additive manufacturing, automation, hybrid and electric vehicles, and community-oriented learning practices.
- The members also appreciated the incorporation of Indian Knowledge System (IKS) concepts through references to traditional engineering practices, indigenous manufacturing methods, ancient measurement systems, passive cooling techniques, biomass utilization, rural technologies, and sustainable design approaches wherever applicable in the curriculum.
- The Board observed that the curriculum effectively integrates cross-cutting issues such as environment and sustainability, professional ethics, gender sensitization, societal responsibility, digital transformation, innovation, and interdisciplinary learning in alignment with the objectives of the National Education Policy (NEP) and Outcome-Based Education (OBE) requirements.

- The external experts suggested strengthening application-oriented learning through industrial case studies, mini-projects, internship activities, community-based problem solving, and practical exposure related to sustainability, smart technologies, and emerging industrial practices.

Resolution:

After detailed deliberations, the Board of Studies members unanimously approved the integration of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) concepts and cross-cutting issues in the III & IV Year Mechanical Engineering curriculum and III Year course syllabi under AU-24 Regulations. The members also recommended periodic review and enhancement of these components in alignment with future academic, industrial and societal requirements. The detailed course-wise mapping of SDGs, IKS concepts and cross-cutting issues is enclosed in **Annexure – III.**

Agenda Item No. BoS/2026/MECH/3.6: Approval of the list of examiners for various courses.

- The Chairman of the Board of Studies presented the list of examiners for III Year courses/subjects for discussion and approval by the members.

Resolution:

After detailed deliberations, the Board of Studies members unanimously approved the list of examiners for III Year courses/subjects. The approved list of examiners is enclosed in **Annexure – IV.**

Agenda Item No. BoS/2026/MECH/3.7: Discussion on introduction of new programs/enhancement of intake, if any.

- The members discussed the possibilities for introduction of new programs and enhancement of intake in the Department of Mechanical Engineering based on emerging industry requirements, student demand and future technological trends.
- The Board members suggested introducing industry-oriented integrated programs and specialization tracks in emerging areas such as Drone Technology, Electric Vehicles, Smart Manufacturing, Robotics, Artificial Intelligence applications in Mechanical Engineering and Defence Technology. The members also suggested exploring collaborations with defence training academies, industries and skill development organizations to enhance practical exposure and employability opportunities for students.
- The members emphasized the importance of strengthening laboratory infrastructure, industry collaborations, skilled faculty availability and research facilities before proposing any new program or enhancement in intake. The importance of improving admissions, placements, internships and industry interaction activities was also highlighted.

Resolution:

After detailed deliberations, the Board of Studies members recommended exploring the feasibility of introducing integrated and interdisciplinary programs aligned with current industrial trends, defence applications and future technological advancements. The members also recommended reviewing the possibility of enhancement of intake in future based on demand, infrastructure facilities and regulatory approvals

Agenda Item No. BoS/2026/MECH/3.8 Any other item with the permission of the Chair.

Nil

HEAD OF THE DEPARTMENT
MECHANICAL ENGINEERING
ANNAMACHARYA UNIVERSITY
RAJAMPET, ANNAMAYYA DIST, A.P.

DEPARTMENT OF MECHANICAL ENGINEERING

Annexures List Details

Annexure No.	Title / Description
Annexure – I	Minutes of the 2nd Board of Studies Meeting held on 9th June 2025 and its Action Taken Report
Annexure – II	Finalized III & IV Year Mechanical Engineering Course Structure, Revised III Year I & II Semester Detailed Syllabi and corresponding Action Taken Report under AU-24 Regulations
Annexure – III	Detailed Mapping of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) and Cross-cutting Issues in the Curriculum
Annexure – IV	Approved List of Examiners for III Year Courses/Subjects.

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RAJAMPET, Annamayya District, AP – 516126, INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

Annexure – I

Minutes of the 2nd Board of Studies Meeting held on 9th June 2025 and its Action Taken Report

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Ref.No.:/AU/SoE/ME/BOS-02/2025-26/MOM-02 Date: 09/06/2025

DEPARTMENT OF MECHANICAL ENGINEERING

2nd BoS Minutes of Meeting

The 2nd meeting of Board of Studies (BoS) for Department of Mechanical Engineering is held in hybrid mode on 9th June, 2025 in Room No. 102 of Mechanical Engineering Block at 09:30 AM in the presence / absence of the following members of the board.

Members of Presence:

Sl.No	Name	Designation	Status
1	Dr. A. Hemantha kumar	Professor& Head Dept. of Mechanical Engineering Annamacharya University Rajampet. Ph: 9440272504 Email: ahkaits@gmal.com	Chairman
2	Dr N. Sivarami Reddy	Professor & Dean R & D Dept of Mechanical Engineering Annamacharya University Rajampet. Ph: 9848998645 Email: aits.med.nsrr@gmail.com	Senior Faculty – Member
3	Mr.B Santhosh Kumar	Assistant Professor Dept of Mechanical Engineering Annamacharya University Rajampet. Ph: 9000916658 Email: aits.med.bsk@gmail.com	Course Coordinator-Member
4	Mr Ajaya Kumar Reddy K	Assistant Professor Dept of Mechanical Engineering Annamacharya University Rajampet. Ph: 9703926212 Email: aits.med.kakr@gmail.com	Course Coordinator-Member
5	Dr Anil Kumar E	Professor Department of Mechanical Engineering IIT Tirupati Email: anil@iittp.ac.in	Subject Expert – Member
6	Dr V Diwakar Reddy	Professor & Head SVU College of Engineering SV University, Tirupati-517501 Ph: 9440088282	Subject Expert – Member
7	Dr B Durga Prasad	Professor, JNTUA College of Engineering, JNTUA-Ananthapuramu. Ph: 9441074399	University Nominee-Member

Sl.No	Name	Designation	Status
8	Mr S Veeranjaneyulu	Head, Business Development Pennar Aerospace Division Hyderabad, Ph: 7799597874 Veera.s@pennarindia.com	Industry Representative – Member
9	Mr S Bala Krishna	HCL Technologies, System Analyst Bengaluru, Ph: 9573572923 Surimisetty.balak@hcltech.com	Alumni Representative - Member

Members of Absence: NIL

Agenda of the Meeting:

Item No	Particulars
BoS/2025/MECH/2.1	Confirmation of the Minutes of the 1st Board of Studies Meeting
BoS/2025/MECH/2.2	To discuss and finalize the course structure and syllabus for II-B. Tech, under the AU-24 Regulations.
BoS/2025/MECH/2.3	To discuss and finalize the scheme and syllabus for II-MTech, under the AU-24 Regulations
BoS/2025/MECH/2.4	To review and address any discrepancies observed in the first year UG (B.Tech,) under the AU-24 Regulations.
BoS/2025/MECH/2.5	To discuss and approve the Programme Educational Objectives (PEOS), Programitie Specific Outcomes (PSOs), and Course Outcomes (CDs) of the respective departments
BoS/2025/MECH/2.6	Discussion on the inclusion of courses aligned with Sustainable Development Goals (SDGs), cross-cutting issues and Indian Knowledge System (IKS) in the curriculum of the respective departments.
BoS/2025/MECH/2.7	To discuss and approve the syllabus for the Annamacharya University Research Admission Test (AURAT)-2025 for the respective departments.
BoS/2025/MECH/2.8	To approve the list of examiners for second year courses/subjects.
BoS/2025/MECH/2.9	To discuss the introduction of new programmes and/or proposals for increase in intake, if applicable.
BoS/2025/MECH/2.10	Discussion on feedback received regarding the curriculum
BoS/2025/MECH/2.11	Any other item with permission of the Chair

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

MINUTES OF THE MEETING

Agenda Item No. BoS/2025/MECH/2.1: Confirmation of the Minutes of the 1st Board of Studies Meeting.

The Chairman of Board of Studies informed the members that the minutes of the 1st Board of Studies meeting of the Department of Mechanical Engineering, School of Engineering, Annamacharya University, held on 28th August 2024, were circulated to all members via email.

Resolution:

All the BOS members approved the Minutes of the 1st Board of Studies meeting held on 28th August 2024. The action taken report is provided in **Annexure-I**

Agenda Item No. BoS/2025/MECH/2.2: To discuss and finalize the course structure and syllabus for II-B. Tech, under the AU-24 Regulations.

Dr A. Hemantha Kumar presented the Second-Year course structure and syllabi to the members. The following discussions were made.

i) Dr Anil Kumar E suggested to shift the topics of **thermodynamic relations** present in Unit-II to Unit-III and revise the unit-III name to "properties of pure substances" in the course title "Basic Thermodynamics".

ii) Dr Anil Kumar E proposed to introduce the new topic: **shape memory alloys(introduction)** at the end of Unit-III in the course title" Material Science & Metallurgy"

iii) Dr Anil Kumar E, Dr B Durga Prasad, Dr.V. Diwakar Reddy, advised few modifications in the course title "Manufacturing Process Lab".
- The trade "Metal Casting" is to be modified to "Casting".
- Under Casting -trade a new experiment is to be incorporated. The name of the experiment is "Identification of Casting Defects".

iv) Dr.N.Siva Rami Reddy suggested to study the work study techniques under elementary treatment in the course title "Industrial Management".

v) Dr Anil Kumar E proposed to introduce the new topic: Boundary layer theory (elementary treatment) at the end of Unit-II in the course title" Fluid Mechanics & Hydraulic Machines".

vi) Dr Anil Kumar E suggested few modifications in the course title "Thermal Energy Systems"
- Remove the topics of Unit-IV (Gas turbines & Jet Propulsions) present in the course title "Thermal Enery systems" and replace these topics in the course title" IC Engines & Gas turbines"

- Split Unit-V(Refrigeration & Air conditioning) topics to Refrigeration as Unit-IV and Air conditioning as Unit-V in the course title " Thermal Energy Systems".
- Add one type of air craft refrigeration into the syllabus of Refrigeration which is decided as Unit-IV.

vii) Dr B Durga Prasad suggested to add the web resources for all the courses present in the course structure.

viii) Dr Anil Kumar E, Dr B Durga Prasad, Dr.V. Diwakar Reddy, advised to incorporate only two prescribed text books for each course title and few modications are made in the textbooks selection for the following subjects.

- Thermal Enerrgy Systems
- Indutrial Management
- Mechanics of Solids
- Theory of Machines
- Basic Thermodynamics

Resolution:

After the deliberations the members of BoS unanimously accepted for incorporation of the above changes in the second year course structure & Syllabi under AU24 regulations and added in **Annexure-II .**

Agenda Item No. BoS/2025/MECH/2.3: To discuss and finalize the scheme and syllabus for II-MTech, under the AU-24 Regulations

Detailed discussion of II- MTech course structure and syllabi was done during the First BoS held on 24th August 2024 by the chairman of Board of Studies under AU-24 regulation.

Resolution:

The students were not admitted to the MTech program under AU-24 regulation during the academic year2024-2025. Hence no firm decisions are taken to this agenda .

Agenda Item No. BoS/2025/MECH/2.4: To review and address any discrepancies observed in the first year UG (B.Tech,) under the AU-24 Regulations.

The Chairman of Board of Studies addressed that there were no discrepancies observed in the first year UG (B.Tech,) under the AU-24 Regulations.

Resolution:

No deliberations are done on this Agenda.

Agenda Item No. BoS/2025/MECH/2.5: To discuss and approve the Programme Educational Objectives (PEOs), Programme Specific Outcomes (PSOs), and Course Outcomes (COs) of the respective departments.

The Chairman of Board of Studies opened a discussion on Vision statement, Mission statement, Programme Educational Objectives (PEOs), Programme Specific Outcomes (PSOs), and Course Outcomes (COs).

i) Dr Anil Kumar E & Mr. S.Veeranjaneyulu suggested a change in PEO 1 statement: Technologically competent enough to analyze, design and solve industrial problems. The change made is: Technologically competent enough to analyze, design and develop industrial solutions.

Resolution:

After the deliberations the members of BoS unanimously accepted the change of PEO1 statement for AU-24 regulations. The Vision, Mission statements are accepted for AU-24 regulations. The course outcomes, PSOs are accepted for AU-24 regulations. The changes are appended in **Annexure III.**

Agenda Item No. BoS/2025/MECH/2.6: Discussion on the inclusion of courses aligned with Sustainable Development Goals (SDGs), cross-cutting issues and Indian Knowledge System (IKS) in the curriculum of the respective departments.

The Chairman of Board of Studies opened a discussion on the inclusion of courses aligned with Sustainable Development Goals (SDGs), cross-cutting issues and Indian Knowledge System (IKS) in the curriculum of the department.

i) No changes are recommended by the BoS members.

Resolution:

After the deliberations the members of BoS unanimously accepted the inclusion of courses aligned with Sustainable Development Goals (SDGs), cross-cutting issues and Indian Knowledge System (IKS) for the II Year course structure asper AU-24 regulation. The approved content is documented in **Annexure-IV**

Agenda Item No. BoS/2025/MECH/2.7: To discuss and approve the syllabus for the Annamacharya University Research Admission Test (AURAT)-2025 for the respective departments.

The Chairman of Board of Studies opened a discussion on approval of the revised syllabus for the Annamacharya University Research Admission Test (AURAT)-2025 for the department.

i) Dr Anil Kumar E suggested to align the AURAT syllabus with the GATE syllabus to the extent possibility.

Resolution:

After the deliberations the members of BoS unanimously accepted the revised syllabus for the Annamacharya University Research Admission Test (AURAT)-2025 for the department and appended in **Annexure-V**.

Agenda Item No. BoS/2025/MECH/2.8: To approve the list of examiners for second year courses/subjects.

The Chairman of Board of Studies opened a discussion on approval of the list of examiners for second year courses/subjects.

Resolution:

After the deliberations the members of BoS unanimously accepted the the list of examiners for second year courses/subjects.The approved examiners were documented in **Annexure-VI**

Agenda Item No. BoS/2025/MECH/2.9: To discuss the introduction of new programmes and/or proposals for increase in intake, if applicable.

The Chairman of Board of Studies opened a discussion on introduction of new programmes and/or proposals for increase in intake.

i) Dr Anil Kumar E suggested to wait for the second turn, as at present the students are shifting to IT-related programmes.
ii) Dr. N. Siva Rami Reddy suggested to introduce the new subject "Applications of Artificial Intelligence and Machine Learning in Mechanical Engineering ".

Resolution:

After the deliberations the members of BoS unanimously accepted the comments made for the agenda.

Agenda Item No. BoS/2025/MECH/2.10: Discussion on feedback received regarding the curriculum.

The Chairman of Board of Studies opened a discussion on feedback about the second-year course structure for AU-24 regulation.

Resolution:

The members of BoS unanimously accepted curriculum designed for the Second year B.Tech of AU-24 regulation.

Agenda Item No. BoS/2025/MECH/2.11: Any other item with permission of the Chair.

Nil

ANNAMACHARYA UNIVERSITY

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(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

ACTION TAKEN REPORT

Board of Studies (BoS) – Department of Mechanical Engineering

Reference: 2nd Board of Studies Meeting held on 9th June 2025

S. No.	Agenda / Suggestions by BoS Members	Action Taken
1	Confirmation of the Minutes of the 1st Board of Studies Meeting.	The Minutes of the 1st Board of Studies Meeting held on 28th August 2024 were circulated to all the members and approved by the BoS members.
2	Dr. Anil Kumar E suggested shifting the topics related to thermodynamic relations from Unit-II to Unit-III and revising Unit-III name to "Properties of Pure Substances" in the subject "Basic Thermodynamics".	The syllabus of Basic Thermodynamics was revised by shifting the thermodynamic relations topics from Unit-II to Unit-III and the unit title was modified as "Properties of Pure Substances".
3	Dr. Anil Kumar E proposed introducing the topic "Shape Memory Alloys (Introduction)" at the end of Unit-III in the subject "Material Science & Metallurgy".	The topic "Shape Memory Alloys (Introduction)" was incorporated at the end of Unit-III in Material Science & Metallurgy syllabus.
4	Modifications suggested in "Manufacturing Process Lab".	The trade name "Metal Casting" was revised as "Casting". A new experiment titled "Identification of Casting Defects" was incorporated under Casting trade experiments.
5	Dr. N. Siva Rami Reddy suggested introducing work study techniques under elementary treatment in the subject "Industrial Management".	Work study techniques under elementary treatment were incorporated in the Industrial Management syllabus.
6	Dr. Anil Kumar E suggested introducing "Boundary Layer Theory (Elementary Treatment)" in Unit-II of "Fluid Mechanics & Hydraulic Machines".	The topic "Boundary Layer Theory (Elementary Treatment)" was included in Unit-II of Fluid Mechanics & Hydraulic Machines syllabus.
7	Suggestions regarding modifications in "Thermal Energy Systems".	The topics related to Gas Turbines and Jet Propulsion were removed from Thermal Energy Systems and incorporated in IC Engines & Gas Turbines syllabus. Refrigeration topics were revised as Unit-IV and Air Conditioning topics as Unit-V. One type of aircraft refrigeration topic was incorporated under Refrigeration.
8	Dr. B. Durga Prasad suggested adding web resources for all courses in the course structure.	Web resources were incorporated in the syllabi of all respective courses wherever applicable.
9	Suggestions regarding limitation of prescribed textbooks and revision of textbook selection for selected subjects.	The prescribed textbooks were revised and limited to two textbooks per course. Necessary modifications were made in the textbook selections for Thermal Energy Systems, Industrial Management, Mechanics of Solids, Theory of Machines and Basic Thermodynamics.

10	Discussion regarding finalization of II-M.Tech syllabus under AU-24 Regulations.	As there were no admissions for M.Tech programme during the academic year 2024-2025 under AU-24 Regulations, no further action was required.
11	Review of discrepancies in I Year UG (B.Tech.) under AU-24 Regulations.	The curriculum and syllabi were reviewed and no discrepancies were observed in I Year UG (B.Tech.) curriculum under AU-24 Regulations.
12	Dr. Anil Kumar E and Mr. S. Veeranjaneyulu suggested modification in PEO-1 statement.	The PEO-1 statement was revised from "Technologically competent enough to analyze, design and solve industrial problems" to "Technologically competent enough to analyze, design and develop industrial solutions".
13	Discussion on inclusion of courses aligned with SDGs, cross-cutting issues and IKS.	SDGs, cross-cutting issues and Indian Knowledge System (IKS) concepts were reviewed and incorporated in the II Year course structure under AU-24 Regulations.
14	Dr. Anil Kumar E suggested aligning AURAT-2025 syllabus with GATE syllabus wherever possible.	The revised AURAT-2025 syllabus was reviewed and aligned with GATE syllabus topics wherever applicable.
15	Approval of list of examiners for second year courses/subjects.	The list of examiners for second year courses/subjects was finalized and approved by the BoS members.
16	Discussion on introduction of new programmes and enhancement of intake.	The BoS members suggested exploring introduction of emerging technology-oriented courses. The proposal regarding "Applications of Artificial Intelligence and Machine Learning in Mechanical Engineering" was considered for future curriculum planning.
17	Discussion on feedback received regarding the curriculum.	The feedback received regarding the AU-24 curriculum was reviewed and the curriculum structure for Second Year B.Tech. was approved by the BoS members.

BOS Chairman
Mechanical Engineering Department

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RAJAMPET, Annamayya District, AP – 516126, INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

Annexure – II

Finalized III & IV Year Mechanical Engineering Course Structure, Revised III Year I & II Semester Detailed Syllabi and corresponding Action Taken Report under AU-24 Regulations

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Rajampet, Annamayya District, A.P – 516126, INDIA

ACTION TAKEN REPORT

3rd Board of Studies (BoS) Meeting – Department of Mechanical Engineering

- **Agenda Item No.:** BoS/2026/MECH/3.2
  Subject: Action Taken Report on Suggestions and Recommendations of BoS Members regarding III & IV Year Mechanical Engineering Curriculum and Syllabi under AU-24 Regulations.

S. No.	Suggestion / Recommendation by BoS Members	Action Taken
1	Dr. V. Diwakar Reddy suggested adding the textbook *Tool Design by Donaldson Cyril* in the reference section of Machining Processes.	The suggested textbook has been incorporated in the reference section of the subject Machining Processes.
2	Dr. V. Diwakar Reddy suggested adding the textbook *Treatise on Heat Engineering by V. P. Vasandani* in the reference section of I.C. Engines & Gas Turbines.	The suggested reference textbook has been included in the syllabus of I.C. Engines & Gas Turbines.
3	Suggestions related to Design of Machine Members regarding revision of spring topics and removal of gasketed joints.	Unit-II has been revised to include only helical and leaf springs with simple problems. Repeated topics related to torsion and leaf spring design were removed. Gasketed joints topic was removed from Unit-III.
4	Suggestion to revise the Unit-V title in Renewable Energy Resources.	Unit-V title was revised as "Tidal, Wave, Hydro and Direct Energy Conversion Systems".
5	Suggestion to revise Mechanical Vibrations Unit-I with cross verification of Theory of Machines syllabus.	Unit-I syllabus was reviewed and revised to avoid overlap with Theory of Machines subject contents.
6	Suggestion to add textbooks by W. T. Thomson and V. P. Singh for Mechanical Vibrations.	The recommended textbooks were added in the reference section of Mechanical Vibrations subject.
7	Suggestion to develop an end product in Machining Process Laboratory utilizing available laboratory resources.	The laboratory activities were revised to encourage development of end products using available machining facilities and resources.
8	Suggestion to introduce clean air technology as a study experiment in Refrigeration & Air Conditioning Laboratory.	Clean air technology was incorporated as a study experiment in the Refrigeration & Air Conditioning Laboratory.
9	Suggestion to introduce a welding experiment in Refrigeration & Air Conditioning Laboratory.	A welding-related experiment was added in the list of experiments of Refrigeration & Air Conditioning Laboratory.
10	Suggestion to add "basic two-dimensional formulation of numerical methods under elementary treatment" in Heat Transfer Unit-I.	The suggested topic is at the level of PG so not incorporated in Heat Transfer subject as this is a UG level course.

11	Suggestion to review Unit-I topics in Metrology and Measurements and remove Sine Bar topic.	The topic "Sine Bar" was removed from Unit-I as it is already covered in the laboratory component.
12	Suggestion to specify methods of pressure measurement such as Bourdon tube and diaphragm methods.	Specific pressure measurement methods including Bourdon tube and diaphragm methods were incorporated in the syllabus.
13	Suggestion to include IGES and STEP file formats and remove CAQC topic in CAD/CAM.	IGES and STEP file formats were included in Unit-II and the topic CAQC was removed from the syllabus.
14	Suggestions related to Smart Manufacturing including network protocols, NSCAD software exposure and case study report.	Network protocols were incorporated in the syllabus. NSCAD software exposure and preparation of industrial case study reports were included in the course activities.
15	Suggestions regarding Additive Manufacturing Unit-IV and Unit-V modifications.	Unit-IV and Unit-V topics were rearranged and Reverse Engineering topics were shifted to Unit-V.
16	Suggestion to plan industrial visits for Automobile Engineering subject.	Industrial visit activities related to automobile systems and industrial practices were proposed as part of experiential learning activities.
17	Suggestions related to Design of Transmission Systems including Lewis equation derivation, syllabus reduction, crankshaft design and additional textbooks.	The syllabus was revised by simplifying selected topics. Lewis equation was incorporated appropriately. Elementary treatment of single web crankshaft design and force diagrams was included. Recommended textbooks by Robert L. Norton and P. Kannaiah were added.
18	Suggestions related to Modern Machining Processes regarding precision engineering applications and Wire EDM.	Precision engineering related applications were added in Unit-II and Wire EDM principles and applications were included in Unit-IV.
19	Suggestion to verify inclusion of North-West Corner Method and Vogel's Approximation Method in Operations Research.	The syllabus was reviewed and standard transportation problem methods including North-West Corner Method and Vogel's Approximation Method were incorporated.
20	Suggestions related to Computational Fluid Dynamics syllabus revision.	The syllabus was revised to basic and elementary level suitable for undergraduate students. Advanced derivations and excessive numerical methods were reduced. Prerequisites were added and Unit-V contents were simplified.
21	Suggestion to add a study experiment on formulation of non-dimensional parameters in Heat Transfer Laboratory.	The suggested study experiment was incorporated in the Heat Transfer Laboratory.
22	Suggestions related to Computer Aided Engineering Laboratory regarding	Experiments related to axisymmetric thermal analysis, thermal stress and thermal strain

	axisymmetric thermal analysis and thermal stress analysis using ANSYS.	analysis using ANSYS were included in the laboratory syllabus.
23	Suggestion to review the inclusion of surface treatment topics in the curriculum.	Surface treatment and surface hardening related topics available in Materials Science and Metallurgy syllabus were reviewed and suitable modifications were proposed.
24	Suggestions related to Product Development Laboratory regarding prerequisites, design process and design exercises.	Prerequisites were reviewed and design-oriented components such as design process, design synthesis, design specifications and design exercises were incorporated in the Product Development Laboratory.

Additional Action Taken on Curriculum Review and Emerging Technologies

- Industry-oriented and interdisciplinary topics related to Smart Manufacturing, Artificial Intelligence, Robotics, Electric Vehicles, Additive Manufacturing and Sustainable Engineering were reviewed and incorporated wherever applicable.
- SDG and Indian Knowledge System (IKS) concepts were mapped across core, elective, laboratory and project courses.
- Skill-oriented, value-added and interdisciplinary learning approaches were strengthened through laboratory activities, case studies, industrial visits and project-based learning.
- The possibility of introducing integrated and interdisciplinary programs related to Drone Technology, Electric Vehicles, Defence Technology and emerging industrial sectors was discussed for future implementation.

All the suggestions and recommendations given by the Board of Studies members and external experts were reviewed carefully and incorporated suitably in the curriculum and syllabus structure wherever applicable. The revised curriculum is aligned with industry requirements, emerging technologies, sustainability concepts and outcome-based education principles.

Head of the Department
Department of Mechanical Engineering
Annamacharya University, Rajampet

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Department of Mechanical Engineering

III Year I Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	PC	24AMEC51T	Machining Processes	3	0	0	3
2	PC	24AMEC52T	I.C. Engines & Gas Turbines	3	0	0	3
3	PC	24AMEC53T	Design of Machine Members	3	0	0	3
4	PE	24AMEC5AT 24AMEC5BT 24AMEC5CT 24AMEC5DT	1. Smart Materials 2. Automation & Robotics 3. Renewable Energy Resources 4. Mechanical Vibrations	3	0	0	3
5	OE	24AMEC5ET	MOOCs (Inter disciplinary 12 weeks)	3	0	0	3
6	PC	24AMEC51L	Machining Processes Lab	0	0	2	1
7	PC	24AMEC52L	I.C. Engines Lab	0	0	2	1
8	PC	24AMEC54L	Refrigeration & Air Conditioning Lab	0	0	2	1
9	SEC	24AMEC55S	MATLAB for Mechanical Engineers	1	0	2	2
10	MC	24AAUD51T	Gender Sensitization	2	0	0	-
11	INTERN	24AMEC56I	Community Service Internship	-	-	-	2
						Total Credits	22

III Year II Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	PC	24AMEC61T	Heat Transfer	3	0	0	3
2	PC	24AMEC62T	Metrology & Measurements	3	0	0	3
3	PC	24AMEC63T	CAD/CAM	3	0	0	3
4	PE	24AMEC6AT 24AMEC6BT 24AMEC6CT 24AMEC6DT	1. Smart Manufacturing 2. Additive Manufacturing 3. Automobile Engineering 4. Design of Transmission System	3	0	0	3
5	PE	24AMEC6ET 24AMEC6FT 24AMEC6GT 24AMEC6HT	1. Modern Machining Processes 2. Operations Research 3. Computational Fluid Dynamics 4. Finite Element Methods	3	0	0	3
6	OE	24AMEC6IT	MOOCs (Inter disciplinary 12 weeks)	3	0	0	3
7	PC	24AMEC61L	Heat Transfer Lab	0	0	2	1
8	PC	24AMEC62L	Metrology & Measurements Lab	0	0	2	1
9	PC	24AMEC64L	Computer Aided Engineering Lab	0	0	2	1
10	SEC	24AENG61L	Soft Skills	1	0	2	2
11	MC	24AMBA61T	Technical Paper Writing & Intellectual Property Rights	2	0	0	-
						Total Credits	23
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation							

K. Ajay Kumar Reddy

B. Santosh Kumar

N. Sivarama Reddy

Dr. G. Suresh Reddy

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Department of Mechanical Engineering

IV Year I Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	PC	24AMEC71T	AIML for Mechanical Engineering	3	0	0	3
3	PE	24AMEC7AT 24AMEC7BT 24AMEC7CT 24AMEC7DT	1. Composite Materials 2. Supply Chain Management 3. Power Plant Engineering 4. Mechatronics	3	0	0	3
4	PE	24AMEC7ET 24AMEC7FT 24AMEC7GT 24AMEC7HT	1. Flexible Manufacturing Systems 2. Production & Operations Management 3. Autonomous Vehicles 4. Design for Manufacturing	3	0	0	3
5	OE	24AMEC7IT 24AMEC7JT 24AMEC7KT 24AMEC7LT	Department Specific: 1. Total Quality Management 2. Non-Destructive Testing 3. Entrepreneurship Development 4. Hybrid and Electric Vehicles	3	0	0	3
6	OE		Other Branches to ME Dept.	3	0	0	3
7	PC	24AMEC72L	Applied Robotic Control Lab	0	0	2	1
8	PC	24AMEC73L	Computer Aided Manufacturing Lab	0	0	2	1
9	PC	24AMEC74L	Product Development Lab	0	0	2	1
10	INTERN	24AMEC75I	Evaluation of Industry Internship	0	0	0	2
						Total Credits	20

Open Elective – IV (offered by other departments to ME Department)

Sl. No.	Category	Course code	Course Title	Offered by the Dept.
1	OE	24ACIV7MT	Disaster Management	Civil Engineering
2		24ACIV7NT	Water Resource Harvesting	
3		24AEEE7UT	Electric Vehicles	Electrical & Electronics Engineering
4		24AEEE7TT	Sustainable Energy Sources	
5		24AECE7VT	Introduction to Image Processing	Electronics & Communication Engineering
6		24AECE7UT	Introduction to Microprocessors and Microcontrollers	
7		24ACSE7QT	Data Base Management Systems	Computer Science Engineering
8		24ACSE7RT	Operating Systems	
9		24AMBA71T	Human Resource Management	Master of Business Administration
10		24AMBA72T	Startup Management	
11		24AAID7MT	Introduction to Data Science	Artificial Intelligence & Data Science

Open Elective Courses to Other Departments Offered by ME Department

Sl. No.	Category	Course code	Course Title	Hours per Week			Credits
				L	T	P	C
1	OE	24AMEC7KT 24AMEC7MT	1. Entrepreneurship Development 2. Optimization Techniques	3	0	0	3

K. Vijay Kumar Reddy B. Santosh Kumar N. Siva Rama Reddy

Dr. G. Ramesh Babu

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Department of Mechanical Engineering

IV Year II Semester

Sl. No.	Category	Course code	Course Title	Hours per Week			Credits
				L	T	P	C
1	PROJ	24AMEC81P	Internship and Project	-	-	24	12

K. Ajay Kumar Reddy

P. Santosh Kumar

N. Sivaram Reddy

(Dr. G. Suresh Babu)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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Title of the Course:	Machining Processes
Category:	PC
Year:	III
Semester:	I
Couse Code:	24AMEC51T
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the fundamentals of metal cutting processes, tool geometry, cutting forces, and the effect of machining parameters on tool life and machinability.
2. To explain the construction, working principles, and operations of lathes, shaping, slotting, and planning machines used in machining.
3. To analyze the principles of drilling, boring, milling operations, and the application of jigs and fixtures for accurate machining.
4. To understand grinding theory, grinding machines, wheel specifications, and finishing processes such as lapping and honing.
5. To gain knowledge of the working principles, advantages, and industrial applications of major non-traditional machining processes such as EDM, ECM, LBM, and USM.

Course Outcomes:

At the end of the course, the student will be able to

1. Explain the principles of metal cutting, tool geometry, cutting forces, and evaluate the influence of machining parameters on tool life and machinability.
2. Demonstrate knowledge of construction, working, and operations of lathe and reciprocating machine tools for various machining applications.
3. Apply the concepts of drilling, boring, milling, and utilize jigs and fixtures for accurate and efficient machining.
4. Analyze abrasive machining processes including grinding, lapping, and honing, and select appropriate grinding wheels and finishing techniques.
5. Compare and interpret the working principles and applications of non-conventional machining processes such as EDM, ECM, LBM, EBM, USM, AJM, and WJM for advanced manufacturing needs.

Unit 1 Elementary treatment of metal cutting theory **12**

Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tool and angles, chip formation and types of chips – built up edge and its effects, chip breakers. Mechanics of orthogonal cutting –Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, heat generation, tool life, coolants, machinability –economics of machining. Cutting Tool materials and cutting fluids –types and characteristics.

Unit 2 Lathe and Reciprocating Machine Tools **11**

Engine lathe – Principle of working- specification of lathe – types of lathes–Taper turning, thread cutting operations and attachments for Lathes. Shaping, Slotting and planning machines - Principles of working, specifications, types, Tools and tool holding devices – operations performed, machining time calculation.

Unit 3 Drilling and Milling **13**

Drilling- Principles of working, specifications, types, Tools and tool holding devices, Principles of design of Jigs and fixtures and uses, Classification of Jigs & Fixtures – Principles of location and clamping –types.

Boring Machines - Principles of working and types.
Milling machine – Principles of working – specifications – classifications of milling machines – methods of indexing, machining operation.

Unit 4 Abrasives Machining **13**

Grinding machine –Theory of grinding – classification– cylindrical and surface grinding machine – Tool and cutter grinding machine – Grinding wheel specification - types of abrasives – bonds, Truing and Dressing of wheels.
Lapping, Honing and Broaching machines – comparison of grinding, lapping and honing.

Unit 5 Introduction to non-conventional Manufacturing Process **12**

Introduction to non-conventional Manufacturing Process: Benefits, application and working principle of EDM, ECM, LBM, EBM, USM, AJM, WJM.

Prescribed Textbook:

1. Production Technology by R.K. Jain and S.C. Gupta, Khanna Publishers, 17th edition.

Reference Books:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014.
2. PN Rao, —Manufacturing Technology||, Tata McGraw Hill, 2017.
3. Modern Machining Processes by P.C. Pandey& H.S. Shan.
4. Manufacturing science by Degarmo, Wiley India.
5. Tool Design by Cyril Donaldson, H. LeCain George, V. C. Goold & Joyjeet Ghose, 5th edition, McGraw Hill Education.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC51T.1	3	2	1	2	2	-	-	-	1	-	1	2	1
24AMEC51T.2	3	2	1	1	2	-	-	1	1	-	1	2	1
24AMEC51T.3	3	3	2	2	3	-	-	1	1	-	1	3	2
24AMEC51T.4	2	2	1	2	2	-	-	-	1	-	1	2	1
24AMEC51T.5	2	2	2	1	2	1	1	-	1	-	2	2	3

Dr. N. Kishore Kumar (Course Coordinator)

K. Ajay Kumar Reddy B. Santosh Kumar Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	I.C. Engines & Gas Turbines
Category:	PC
Year	III
Semester:	I
Course Code:	24AMEC52T
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To Gain knowledge on basic concepts of an I C Engine.
2. To Acquaint with concept of combustion in SI & CI engines.
3. To Familiarize about various methods for measurement of engine performance.
4. To Provide insight on Air compressors.
5. To Provide knowledge on Gas turbines.

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the concepts of IC engines.
2. Comprehend the combustion in SI & CI engines.
3. Calculate the performance of IC Engines.
4. Calculate the performance of Air compressors.
5. Calculate the performance of Gas Turbines.

Unit 1 Introduction to I.C. Engines **14**

Classification - Working principles, Valve and Port Timing Diagrams, Engine systems – Fuel, Simple Carburetor, Fuel Injection System – Air Injection system, Solid Injection system and Electronic Injection system. Ignition –Battery ignition system and Magneto ignition system, Cooling – Air cooling (Cooling Fins) and liquid cooing system – Thermo syphon system and Forced Circulation system and Lubrication - Importance - Mist Lubrication System, Wet sump Lubrication system and Dry sump Lubrication system.
Actual Cycles and Their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down - Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

Unit 2 Combustion in SI & CI Engines **11**

Combustion in SI engine: Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Type of Abnormal Combustion, Pre-Ignition and Knocking (Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives, Combustion Chambers.
Combustion in CI Engines: Stages of Combustion – Delay Period and Its Importance – Effect of Engine Variables – Diesel Knock– Combustion Chambers (DI And IDI), Fuel Requirements and Fuel Rating.

Unit 3 Testing and performance of IC engines. **12**

Testing and Performance: Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, Brake Power – Determination of Frictional Losses and Indicated Power – Performance Test – Heat Balance Sheet and Chart.

Unit 4 Air Compressors **11**

Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors,

Problems Related to Reciprocating Compressors, Working principles of Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow Compressors

Unit 5 Gas Turbines **12**

Gas Turbines: Simple gas turbine plant, Brayton cycle, closed cycle and open cycle for gas turbines, actual cycle. Methods to improve performance: regeneration, intercooling and reheating.
Introduction to jet propulsion: working principle of ramjet, turbojet, turboprop and pulse jet engines, Thrust, Thrust Power and Propulsion Efficiency

Prescribed Textbooks:

1. I.C. Engines - V. Ganesan- TMH- 4th edition -2017- ISBN-13. 978-1259006197
2. Thermal Engineering-Rajput-Lakshmi Publications -11th edition -2020- ISBN-13. 978-8131808047.

Reference Books:

1. Internal Combustion Engine Fundamentals- John B. Heywood- TMH-2018-ISBN: 9781260116106
2. Thermodynamics & Heat Engines- B. Yadav- Central Book Depot., Allahabad -2002-ISBN-13: 978-8185444031
3. Treatise On Heat Engineering in MKS And SI Units, 4/e, V P Vasandani, Metropolitan Book Co. (p) Ltd. ISBN-13: 978-8120003507

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC52T.1	3	2	-	-	-	-	-	-	-	-	1	2	-
24AMEC52T.2	3	2	-	-	-	-	-	-	-	-	1	2	1
24AMEC52T.3	3	3	2	1	-	-	-	-	-	-	1	2	2
24AMEC52T.4	3	3	2	2	-	-	-	-	-	-	1	2	2
24AMEC52T.5	3	3	2	2	-	-	-	-	-	-	1	2	2

(Dr. B. Venkatesh)
(Course co-ordinator)

K. Ajay Kumar Reddy B. Santosh kumar Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Design of Machine Members
Category: PC
Year: III
Semester: I
Course Code: 24AMEC53T
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the mechanical engineering design process for static loads under various loading conditions.
2. To understand the mechanical engineering design process for dynamic loads under various loading conditions and design of springs.
3. To explore the design principles and analysis of bolted and welded joints and butt welds under various loading conditions.
4. To study the design principles of power transmission shafts and couplings, focusing on the analysis of shafts subjected loads, as well as the design of various types of couplings.
5. To demonstrate the design principles of sliding and rolling contact bearings, gears, spur gears, beam strength, and load considerations.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply design principles for components subjected to static loads.
2. Apply design principles for components subjected to static loads and designing of springs subjected to external loads.
3. Design power transmission shafts and couplings for fluctuating loads, and selecting appropriate couplings such as flange, bushed pin, and universal couplings.
4. Design power transmission shafts and couplings for fluctuating loads, and selecting appropriate couplings such as flange, bushed pin, and universal couplings.
5. Design and analyze the sliding and rolling contact bearings, spur gears, considering beam strength, dynamic, and wear load factors.

Unit 1 Introduction & Design for Static loads **14**

Mechanical Engineering Design: Design process, design considerations, codes and standards of designation of materials, selection of materials.

Design for Static Loads: Modes of failure, design of components subjected to axial, bending, torsional and impact loads. Theories of failure for static loads.

Unit 2 Design for Dynamic Loads & Design of Springs **13**

Design for Dynamic Loads: Endurance limit, fatigue strength under axial, bending and torsion, stress concentration, notch sensitivity. Types of fluctuating loads, fatigue design for infinite life. Soderberg, Goodman and modified Goodman criterion for fatigue failure. Fatigue design under combined stresses.

Springs: Design of helical compression springs and leaf springs (simple problems)

Unit 3 Design of Bolted & Welded Joints **12**

Design of Bolted Joints: Threaded fasteners, preload of bolts, various stresses induced in the bolts. Torque requirement for bolt tightening and eccentrically loaded bolted joints.

Welded Joints: Strength of lap and butt welds, Joints subjected to bending and torsion. Eccentrically loaded welded joints.

Unit 4 Design of shafts & Couplings **12**

Power Transmission Shafts: Design of shafts subjected to bending, torsion and axial loading. Shafts subjected to fluctuating loads.

Couplings: Design of flange and bushed pin couplings.

Unit 5 Design of Bearings and Gears **14**

Design of Sliding Contact Bearings: Lubrication modes, bearing modulus, McKee's equations, design of journal bearing. Bearing Failures.

Design of Rolling Contact Bearings: Static and dynamic load capacity, Stribeck's Equation, equivalent bearing load, load-life relationships, load factor, selection of bearings from manufacturer's catalogue.

Design of Gears: Spur gears, beam strength, Lewis equation, design for dynamic and wear loads.

Prescribed Textbook:

1. Design of Machine Elements, V.B.Bhandari, 3/e, Tata McGraw Hill, 2010.ISBN-13:978-9390177479

Reference Books:

1. Machine Design, R.K. Jain, Khanna Publications, 1978.; ISBN-13:978-89195207503
2. Mechanical Engineering Design, J.E. Shigley, 2/e, Tata McGraw Hill, 1986.; ISBN-13:978-0073398204
3. Design data handbook, K. Mahadevan & K.Balaveera Reddy, CBS Publications, 4/e, 2019. ISBN-13:978-8123923154
4. Machine design, Dr. N. C. Pandya &Dr. C. S. Shah, 17/e, Charotar Publishing House Pvt. Ltd, 2022. ISBN-13:978-7385039539
5. Machine Design an Integrated approach, R.L. Norton, 2/e, Pearson Education, 2004. ISBN-13:978-0131481901

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC53T.1	3	2	2	2	-	-	-	-	-	-	-	2	3
24AMEC53T.2	3	3	2	3	-	-	-	-	-	-	-	2	2
24AMEC53T.3	3	3	3	3	-	-	-	-	-	-	-	2	2
24AMEC53T.4	3	3	3	3	-	-	-	-	-	-	-	3	2
24AMEC53T.5	3	3	3	3	-	-	-	-	-	-	-	2	1

Dr. M. Maruthi Prasad
Course Coordinator

K. Ajay kumar Reddy

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Smart Materials
Category: PE
Year: III
Semester: I
Course Code: 24AMEC5AT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the fundamental characteristics of different metals and gain insight into smart materials, including their classification and real-world applications.
2. To acquire knowledge of various types of smart materials, including electro-rheological fluids and shape memory materials.
3. To explore the processing techniques of smart materials and fluids, with emphasis on synthesis and fabrication methods such as metallization and UV curing.
4. To develop an understanding of different types of sensors, including advanced carbon nanotube and polymer-based sensors.
5. To comprehend the principles, types, and applications of actuators used in smart systems, including electro-thermal actuators.

Course Outcomes:

At the end of the course, the student will be able to

1. Explain and distinguish between traditional engineering materials and smart materials, and identify appropriate smart materials for various engineering applications.
2. Explain the working principles, properties, and applications of different smart materials and evaluate their suitability for specific engineering and technological applications.
3. Describe and apply suitable processing and fabrication techniques for different smart materials in engineering applications.
4. Identify, describe, and equate different sensor technologies and select appropriate sensors for engineering applications.
5. Demonstrate the working mechanisms of various actuators compare and select suitable actuation methods for different smart materials for create system applications.

Unit 1 Fundamentals of Smart Materials **10**

Introduction: Characteristics of metals, polymers and ceramics. Introduction to smart materials. Classification of smart materials, Components of a smart System; Applications of smart material.

Unit 2 Smart Materials and Their Applications **11**

Smart Materials Piezoelectric materials, Electro strictive Materials, Magnetostrictive materials, Magnetoelectric materials, Magnetorheological Electrorheological fluids, Shape Memory materials.

Unit 3 Processing and Fabrication of Smart Materials **12**

Processing of Smart Materials Semiconductors and their processing, Metals and metallization techniques, Ceramics and their processing, Polymers and their synthesis, UV radiation curing of polymers, fluids.

Unit 4 Smart Sensors and Their Applications **13**

Sensors Introduction, Conductometric sensors, Capacitive sensors, Piezoelectric sensors, Magnetostrictive sensors, Piezoresistive sensors, Optical sensors, Resonant sensors, semiconductor-based sensors, Acoustic sensors, polymerize sensors, Carbon nanotube sensors.

Unit 5 Actuators and Smart Actuation Systems **13**

Actuators Introduction, Electrostatic transducers, Electromagnetic transducers, Electrodynamic transducers, Piezoelectric transducers, Electro-strictive transducers, Magneto-strictive transducers, Electro thermal actuators, Comparison of actuation, Applications

Prescribed Textbook:

1. Smart Material Systems and MEMS: Design and Development Methodologies, V. K. Varadan, K. J. Vinoy, S. Gopalakrishnan, John Wiley and Sons, England, 2006

Reference Books:

1. Smart Structures and Materials, Brain Culshaw, Artech House, London, 1996
2. Smart Materials and Structures, Mukesh V. Gandhi, Brian S. Thompson, , Springer, May- 1992.
3. Smart Structures: Analysis and Design, A. V. Srinivasan, Cambridge University Press, Cambridge, New York, 2001.
4. Smart Structures, P. Gauenzi, Wiley, 2009.
5. Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers, G. Gautschi, Springer, Berlin, New York, 2002
6. Analysis and Performance of Fiber Composites, B. D. Agarwal and L. J. Broutman, John Wiley & Sons
7. Engineering aspects of Shape memory Alloys, T. W. Duerig, K. N. Melton, D. Stockel,C.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC5AT.1	3	2	2	-	-	1	-	-	-	-	2	2	2
24AMEC5AT.2	3	3	2	2	-	-	-	-	-	-	2	2	3
24AMEC5AT.3	3	2	3	2	2	-	-	-	-	-	2	3	3
24AMEC5AT.4	3	2	2	2	3	-	-	-	-	-	2	2	2
24AMEC5AT.5	3	2	3	2	2	-	-	-	-	-	2	2	3

Dr. B. Devaraj Naik
(Course Coordinator)

K. Ajay Kumar Reddy

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Automation & Robotics
Category: PE
Year: III
Semester: I
Course Code: 24AMEC5BT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To acquire basic knowledge on automation and automated flow lines in automatic manufacturing systems.
2. To learn about the line balancing methods and automated assembly systems
3. To learn about the robotics and fundamentals of robots with their needs in present trend.
4. To understand robot kinematics, dynamics and to acquire knowledge on importance of trajectory planning in robots.
5. To learn about the sensors, actuators and robot programming methods used in robots

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the concepts of an automation and automated flow lines
2. Analyze the line balancing methods and assembly systems
3. Summarize the fundamentals of Robots
4. Analyze the Robot kinematics, dynamics and trajectory planning
5. Summarize the concept of Robot actuators, sensors and applications.

Unit 1 Automation & Automated flow lines **09**

Introduction to Automation, Need, automation principles, automation strategies, Types, Basic elements of an automated system, levels of automation, hardware components for automation and process control. Automated flow lines: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage- Elementary treatment

Unit 2 Assembly Systems and Line Balancing **08**

The Assembly Process, Assembly Systems, Manual Assembly Lines, The Line Balancing Problem, Methods of Line Balancing, Other ways to improve the Line Balancing, Flexible Manual Assembly Lines.

Unit 3 Introduction to Industrial Robots **08**

Need for robots in Present customization, Classification, laws of robots. Robot configurations, Functional line diagram, Degrees of Freedom, Components, common types of arms, joints, grippers.

Unit 4 Manipulator Kinematics, Dynamics & Trajectory Planning **13**

Manipulator Kinematics: Homogeneous transformations as applicable to rotation and translation – D-H notation, Forward and inverse kinematics

Manipulator dynamics: Differential transformation, Jacobians. Lagrange – Euler - Elementary treatment

Trajectory Planning: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion.

Unit 5 Robot Actuators, Sensors, Programming & Application 10

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors, comparison Position sensors – potentiometers, resolvers, encoders – Velocity sensors, tactile sensors, Proximity sensors. Robot applications- Assembly, Spray painting, Loading &unloading, Inspection and material handling

Prescribed Textbooks:

1. M. P. Groover, Automation, Production systems and CIM. Pearson Edu 2004. ISBN-10: 9789332572492, ISBN-13: 978-9332572492
2. Niku Saeed B., Introduction to Robotics: Analysis, systems, Applications, PHI New Delhi. ISBN-10: 0130613096.

Reference Books:

1. M.P. Groover, Industrial Robotics. TMH 2003. ISBN-10: 007024989X
2. Saha, S.K., Introduction to Robotics, Second Edition McGraw Hill New Edition 2014. ISBN: 9789332902800
3. Fu KS, Robotics. McGraw Hill. 2014. ISBN: 9780071822282

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC5BT.1	2	2	1	1	-	-	-	-	-	-	-	1	1
24AMEC5BT.2	3	3	2	2	-	-	-	-	-	-	-	2	2
24AMEC5BT.3	2	2	1	1	-	-	-	-	-	-	-	1	1
24AMEC5BT.4	3	3	2	2	-	-	-	-	-	-	-	2	2
24AMEC5BT.5	2	2	1	1	-	-	-	-	-	-	-	1	1

(N. Deephi)
Course coordinator

K. Ajay kumar Reddy

B. Santosh kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Renewable Energy Resources
Category: PE
Year: III
Semester: I
Course Code: 24AMEC5CT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To grasp the role and potential of new and renewable source
2. To provide on insight the types and working principles of solar energy collectors.
3. To gain Knowledge as of solar energy storage and Wind Energy.
4. To familiarize the concepts of Biomass & Geothermal energy.
5. To become conversant with Ocean energy and direct energy conversion.

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the basics of solar radiation and its instruments.
2. Summarize the types of solar collectors and their applications.
3. Summarize the types of energy storage systems and working of wind mills and their applications.
4. Summarize the concepts of Bio-Mass energy and Geothermal resources.
5. Summarize the concepts of Ocean thermal energy conversion plants, wave energy, tidal energy and different direct energy conversion systems.

Unit 1 Principles Of Solar Radiation **13**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Unit 2 Solar Energy Collection **11**

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Unit 3 Solar Energy Storage and Wind Energy **13**

Solar Energy: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Unit 4 Bio-Mass **12**

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Unit 5 Tidal, Wave, Hydro and Direct Energy Conversion Systems **13**

OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, and principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, MHD generators, MHD accelerator, MHD Engine, power generation systems. Fuel cells – working principles of hydrogen fuel cell, phosphoric acid fuel cell, alkaline fuel cell, selection of fuels - and operating conditions.

Prescribed Textbook:

1. Non-Conventional Energy Sources /G.D. Rai Khanna Publisher, ISBN-10 : 9788174090737

Reference Books:

1. Renewable Energy Sources/ Twidell & Weir 3rd edition Routledge publisher (2015)
2. Non-Conventional Energy Resources, B.H.Khan, McGrawHIll, 2015
3. Principles of Solar Energy/ Frank Krieth & John F Kreider.
4. Richard Stone, Jeffrey K. Ball, Automotive Engineering Fundamentals" SAE International, 2004.
5. Non-Conventional Energy/ Ashok V Desai/ Wiley Eastern

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC5CT.1	2	2	1	2	-	-	-	-	-	-	-	1	2	1
24AMEC5CT.2	2	2	1	2	-	-	-	1	-	-	-	1	1	1
24AMEC5CT.3	2	2	1	2	-	-	-	1	-	-	-	1	2	1
24AMEC5CT.4	2	2	1	2	-	-	-	1	-	-	-	1	1	1
24AMEC5CT.5	2	2	1	2	-	-	-	1	-	-	-	1	2	1

(T. Manimohan)
Course coordinator

K. Ajay Kumar Reddy

B. Santosh Kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Mechanical Vibrations
Category: PE
Year: III
Semester: I
Course Code: 24AMEC5DT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To Introduce fundamental concepts of vibration analysis, focusing on Single Degree Freedom (SDOF) systems and their solutions.
2. To Develop understanding of forced vibration, resonance, and damping effects in Single Degree Freedom systems, including vibration isolation.
3. To Explore the dynamics of Two Degree Freedom (TDOF) systems and their application in vibration absorbers and coupled systems.
4. To Familiarize Multi Degree Freedom (MDOF) systems, methods for formulating equations of motion, and vibration analysis techniques.
5. To Explain vibration measurement tools, transducers, and exciters used in experimental vibration analysis

Course Outcomes:

At the end of the course, the student will be able to

1. Define, Understand and Solve problems related to undamped and damped free vibrations in Single Degree Freedom systems using classical and energy methods.
2. Analyze forced vibrations in Single Degree Freedom systems under various excitation forces, apply and evaluate the concepts of transmissibility and isolation.
3. Analyze forced vibrations in Single Degree Freedom systems under various excitation forces, apply and evaluate the concepts of transmissibility and isolation.
4. Formulate equations of motion, and perform modal analysis of free and forced vibrations. Apply vibration measurement tools to select appropriate exciters for vibration testing.
5. Explain and evaluate the damping characteristics in vibrating systems, including the effects of viscous damping, Coulomb damping, and damping in whirling of shafts.

Unit 1 Single Degree Freedom Systems **14**

Single Degree Freedom Systems: Introduction to vibrations, free and damped vibrations, natural frequency and equation of motion. Undamped free vibration, energy method, equivalent systems and torsional systems. Viscous damping, under damped, critically damped and over damped systems. Coulomb damping and equivalent damping coefficient. Forced vibrations, resonance and simple numerical problems.

Unit 2 Forced vibrations of Single Degree Freedom Systems **13**

Steady state forced vibration, sources of excitation, impressed harmonic force, resonance impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping.

Unit 3 Two Degree Freedom Systems **13**

Two Degree Freedom Systems: Formulation of Equation of motion, Natural frequencies and modes of vibration by classical method, coupled pendulum, forced vibration, dynamic vibration absorber.

Unit 4 Multi Degree Freedom Systems **12**

Lagrangian method for formulation of equation of motion Influence co- efficient method, Lumped mass and distributed mass systems, Stodola method, Holzer's method, model analysis of free and forced vibrations.

Unit 5 Vibration measurement and Applications **14**

Transducers: variable resistance transducers, Piezoelectric transducers, electro dynamic transducers and linear variable differential transformer transducer; Vibration pickups: vibrometer, accelerometer, velometer and phase distortion; Frequency-measuring instruments; Vibration exciters- Mechanical exciters and electro dynamic shaker.

Prescribed Textbook:

1. Singiresu S. Rao, Mechanical Vibrations, 6/e, Pearson Education, 2018. ISBN-13:978-0132128193

Reference Books:

1. G.K.Groover, Mechanical Vibrations, Nemchand& Bro, 8/e, 2009. ISBN-13:978-8185240565
2. L. Meirovich, Elements of Vibrations Analysis, Tata McGraw Hill, 1986. ISBN-13:978-0070413429
3. Mechanical Vibrations by VP Singh, Dhanpat Rai & Co. (P) Ltd ISBN-13 : 978-8177004014
4. Mechanical Vibrations by W. T. Thomson, Prentice Hall Press

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC5DT.1	3	3	2	2	-	-	1	-	1	-	1	2	3
24AMEC5DT.2	2	3	2	2	-	-	1	-	1	-	1	3	3
24AMEC5DT.3	3	3	2	2	-	-	1	-	1	-	1	3	3
24AMEC5DT.4	2	3	2	3	-	-	1	-	1	-	1	2	3
24AMEC5DT.5	3	2	2	2	-	-	1	-	1	-	1	3	3

Dr. P.V. SANJEEVA KUMAR
Course coordinator

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Machining Processes Lab
Category:	PC
Year:	III
Semester:	I
Course Code:	24AMEC51L
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To provide practical knowledge of lathe operations such as facing, turning, step turning, taper turning, threading, and knurling.
2. To develop skills in production machining and hole-making processes using Capstan Lathe and Radial Drilling Machine.
3. To understand the working principles and applications of reciprocating machine tools such as Shaper and Slotter for surface and keyway machining.
4. To impart hands-on experience in milling operations, including slot milling and gear cutting using indexing mechanisms.
5. To familiarize with grinding and tool sharpening processes using Cylindrical/Surface Grinding and Tool & Cutter Grinding machines for achieving dimensional accuracy and surface finish.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply lathe machining techniques to perform facing, plain turning, step turning, taper turning, threading, and knurling operations to obtain required dimensions.
2. Operate Capstan Lathe and Radial Drilling Machine to carry out sequential production operations such as drilling, reaming, tapping, and batch component manufacturing.
3. Demonstrate and select appropriate parameters for machining flat surfaces, slots, and keyways using Shaper and Slotting machines
4. Execute milling operations including slot milling and spur gear cutting using indexing heads and suitable cutters.
5. Assess grinding wheel selection, grinding parameters, and tool angles while performing cylindrical grinding and cutting tool sharpening to achieve required surface finish and accuracy.

List of experiments: **12 Weeks**

1. Perform Facing, Plain Turning and Step Turning Operations on a Lathe
2. perform Taper Turning by Compound Rest Method, External Thread Cutting and Knurling on Lathe.
3. perform Facing, Plain Turning, drilling, reaming, and tapping to produce multiple identical components.
4. Set up the Radial Drilling Machine and perform drilling, and tapping operations on a given workpiece
5. Machine a flat horizontal surface on the given workpiece using a Shaper Machine.
6. Cut an internal slot or keyway on the given workpiece using a Slotting Machine.
7. Cut spur gear teeth on the given workpiece using a Milling Machine with the indexing head.
8. Grind the external cylindrical surface of the given workpiece to the required dimension using a Cylindrical Grinding Machine.
9. Grind and sharpen a single-point cutting tool to the specified tool angles using a Tool and Cutter Grinding Machine.
10. Perform Boring Operation on Lathe.
11. Perform Spot Facing Operation on Drilling Machine.

NOTE: Any 10 out of 11 experiments can be conducted.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC51L.1	3	2	1	2	3	-	-	1	1	-	2	3	2
24AMEC51L.2	3	2	2	2	3	-	-	2	1	-	2	3	3
24AMEC51L.3	3	3	2	2	3	-	-	2	1	-	2	3	2
24AMEC51L.4	3	2	2	2	3	-	-	2	1	-	2	3	3
24AMEC51L.5	3	2	1	2	3	-	-	1	1	-	2	3	2

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: I.C. Engines Lab
Category: PC
Year III
Semester: I
Course Code: 24AMEC52L
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To impart knowledge on working principles of various thermal equipment's like compressors, IC Engines, Boilers etc.,
2. To study the working principle of IC engines, performance and characteristics in terms of heat balancing, economical speed variations, air fuel ratio etc.,

Course Outcomes:

At the end of the course, the student will be able to

1. Calculate the performance of 4-Stroke Diesel and Petrol engine.
2. Calculate the Engine friction of 4-Stroke Multi cylinder Engine and Air/Fuel ratio and Volumetric efficiency of I.C. Engines.
3. Calculate the heat balance of the IC Engines.
4. Calculate the efficiencies and performance characteristics of the engines.
5. Study the boilers and identify of the engine parts.

List of Experiments **12 Weeks**

1. Draw the Valve / Port Timing Diagrams of an I.C. Engines
2. Performance Test on a 4 -Stroke Diesel Engines
3. Performance Test on a 4-Stroke Petrol engine
4. Performance Test on a 4-Stroke Multi cylinder Petrol engine
5. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine
6. Retardation and motoring test on 4- stroke engine
7. Heat balance sheet on four stroke single cylinder diesel engine.
8. Heat balance sheet on four stroke single cylinder petrol engine.
9. Heat balance sheet on four stroke multi cylinder petrol engine.
10. Performance Test on Reciprocating Air – Compressor Unit
11. Dismantling / Assembly of Engines to identify the parts and their position in an engine.
12. Performance test on refrigeration test rig.
13. Viscosity of the oil through saybolt viscometer apparatus
14. (a) Calorific value of fuel using bomb calorimeter.
    (b) Flash and fire point by Cleveland open cup apparatus.

Study Experiment

1. Study of Boilers

Note: Any 10 out of 14 Experiments can be conducted.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC52L.1	3	2	3	1	-	1	1	2	2	1	2	3	2
24AMEC52L.2	3	3	3	1	-	1	1	2	2	1	2	3	2
24AMEC52L.3	3	2	3	1	-	1	1	2	2	1	2	3	2
24AMEC52L.4	3	3	3	1	-	1	1	2	2	1	2	3	2
24AMEC52L.5	2	1	2	1	-	2	1	2	2	1	2	2	2

(Dr. B. Venkatesh)
Course co-ordinator

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B. Santosh Kumar

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Refrigeration & Air Conditioning Lab
Category: PC
Year: III
Semester: I
Course Code: 24AMEC54L
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To understand the principles of vapor compression refrigeration system.
2. To gain the knowledge on various components of vapor compression refrigeration system and its thermodynamic cycle
3. To familiarize with the properties of various refrigerants used in the commercial refrigeration and air conditioning units and their effect on environment.
4. To understand the principle of Air-conditioning system and usage of Psychometric Chart.
5. To understand human comfort conditions and estimate the effect of various cooling and heating loads in an air-conditioning system.

Course Outcomes:

At the end of the course, the student will be able to

1. Calculate the COP of Vapour compression refrigeration test rig.
2. Solve the COP value of the Domestic refrigerator and diagnose the troubles encountered.
3. Demonstrate the knowledge of various refrigerants-filling procedure-quantity of refrigerant used.
4. Solve the COP value of the Split Air conditioner and diagnose the troubles encountered.
5. Estimate the Tonnage of Air conditioning.

List of Experiments: **12 Weeks**

1. Demonstration of various components of Vapor compression refrigeration system cut models and calculate its COP.
2. Demonstration of various components of Domestic Refrigerator in working condition and calculate its COP.
3. Trouble shooting of the Domestic refrigerator like leakage of refrigerant, failure of thermostat, failure of compressor motor, failure of insulation, etc.,
4. Study of various refrigerants used in the various refrigeration and air conditioning units.
5. Study of refrigerant filling procedure in various refrigeration and air conditioning units used commercially.
6. Demonstration of Brazing operation in refrigeration and air conditioning systems.
7. Knowing the quantity of refrigerants filled in the domestic refrigeration and air conditioning units. Knowing the price of refrigerants and their suppliers' details.
8. Demonstration of various components of Domestic Split Air-conditioner in working condition and calculate its COP.
9. Trouble shooting of the Domestic Split Air-conditioner like leakage of refrigerant, failure of thermostat, failure of compressor motor, failure of condenser fan, failure of evaporator blower, failure of air filtering element, etc.,
10. Estimation of cooling loads for a room based on the area of room, no. of occupants in the room and no. of electrical Gadgets present in the room. (Analytical)
11. Determining the tonnage of air conditioner. (Analytical)
12. Study on clean air technology.

NOTE: Any 10 out of 12 experiments to perform.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC54L.1	3	3	3	2	-	-	-	-	-	-	1	1	1
24AMEC54L.2	3	3	3	3	-	-	-	-	-	-	1	1	1
24AMEC54L.3	2	2	2	2	-	-	-	-	-	-	1	1	1
24AMEC54L.4	3	3	2	3	-	-	-	-	-	-	1	1	1
24AMEC54L.5	3	3	3	3	-	-	-	-	-	-	1	1	1

(B. Sailaja Kumari)

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: MATLAB for Mechanical Engineers
Category: SEC
Year: III
Semester: I
Course Code: 24AMEC55S
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. To introduce students to MATLAB environment, basic programming constructs, and matrix operations for solving fundamental mechanical engineering problems.
2. To enable students to develop structured MATLAB programs and visualize engineering data effectively.
3. To apply numerical methods in MATLAB for solving complex mechanical engineering problems.
4. To develop mathematical models and simulate mechanical systems using MATLAB and Simulink.
5. To apply advanced MATLAB toolboxes for optimization, analysis, and real-world mechanical engineering applications

Course Outcomes:

At the end of the course, the student will be able to

1. Apply basic MATLAB programming concepts and matrix operations to solve fundamental mechanical engineering problems.
2. Develop structured MATLAB programs and visualize engineering data using 2D and 3D graphical tools.
3. Implement numerical methods in MATLAB to analyze and solve mechanical engineering mathematical models.
4. Model and simulate mechanical systems using MATLAB and Simulink for dynamic system analysis.
5. Utilize advanced MATLAB toolboxes for optimization, data analysis, and real-world mechanical engineering applications.

Unit 1 Fundamentals of MATLAB and Programming Basics **3T + 6L**

Introduction to MATLAB environment, MATLAB desktop, command window, editor, workspace, Variables, constants, and data types, Vectors and matrices – creation and operations, Mathematical operations and built-in functions, Relational and logical operators, Input/output commands, Script files and function files, Control statements: if, else, switch, Looping statements: for, while.

Mechanical Applications: Simple engineering calculations – stress, strain, velocity, acceleration computations.

Unit 2 Advanced Programming and Data Visualization **3T + 6L**

User-defined functions, Nested functions, Arrays and matrix manipulation, String operations, 2D plotting – plot(), subplot(), fplot(),3D plotting – mesh(), surf(), contour(),Graph customization (labels, legends, grids), Data import/export (Excel, CSV files),Debugging techniques.

Mechanical Applications: Plotting stress-strain curves, load-deflection graphs, temperature distribution plots.

Unit 3 **4T + 8L**

Roots of equations (bisection, Newton-Raphson using MATLAB), Linear algebraic equations, Gauss elimination, LU decomposition), Interpolation and curve fitting, Numerical differentiation, Numerical integration (Trapezoidal, Simpson's rule), Ordinary Differential Equations (ODE45 solver)

Mechanical Applications: Vibration analysis, heat transfer problems, beam deflection, dynamic system modelling.

Unit 4 **4T + 8L**

Mathematical modelling basics, Transfer functions, Laplace transform in MATLAB, Introduction to Simulink, Block diagram modelling, Simulation of mechanical systems, Mass-spring-damper system, DC motor modelling, PID controller design.

Mechanical Applications: Control of mechanical systems, dynamic response analysis, system stability.

Unit 5 Advanced Tools and Mechanical Engineering Case Studies **4T + 8L**

Optimization toolbox, Curve fitting toolbox, Symbolic math toolbox, Image processing basics, Finite Element Method basics in MATLAB, Data analysis and signal processing, Mechanical case studies-Vibration signal analysis, Thermal analysis, Fatigue life prediction, Composite material modelling.

Prescribed Textbook:

1. MATLAB: A Practical Introduction to Programming and Problem Solving" by Stormy Attaway

Reference Books:

1. MATLAB an Introduction with Applications by Rao V. Dukkipati.
2. Numerical Methods with MATLAB: Implementations and Applications" by Gerald W. Recktenwald.
3. MATLAB Programming for Engineers" by Stephen J. Chapman.
4. Simulink: Dynamic System Simulation for MATLAB" by Tobias & Hao.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC55S.1	3	2	1	1	3	-	-	1	1	-	2	2	-
24AMEC55S.2	3	2	2	1	3	-	-	2	2	-	2	3	1
24AMEC55S.3	3	3	2	2	3	-	-	1	1	-	2	3	2
24AMEC55S.4	3	3	3	2	3	1	-	2	1	1	2	3	3
24AMEC55S.5	3	3	3	3	3	1	-	2	2	1	3	3	3

N. Ishore Kumar
Dr. Ishore Kumar. N (Course Coordinator)

K. Ajay Kumar Reddy

B. Santosh Kumar

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Heat Transfer
Category:	PC
Year:	III
Semester:	II
Course Code:	24AMEC61T
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart the basic laws of conduction, convection, radiation heat transfer and their applications
2. To provide knowledge about heat flow in various systems.
3. To familiarize the convective heat transfer concepts.
4. To understand the principles of phase change processes and radiation heat transfer.
5. To make conversant about heat transfer in various heat exchangers

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the modes of heat transfer
2. Apply the knowledge of conduction heat transfer for various geometry.
3. Calculate heat transfer rates in forced and free convection. L3
4. Calculate the heat transfer rates during phase change process and radiation.
5. Evaluate the performance of the heat exchangers

Unit 1 Introduction to conduction heat transfer **8**

Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates – Basic two-dimensional heat conduction and elementary numerical methods. Boundary and initial conditions.

Unit 2 One dimensional steady state & transient heat conduction **14**

One Dimensional Steady State Heat Conduction: In homogeneous slabs, hollow cylinders, Critical radius of insulation-Extended surface (fins) Heat Transfer – Long Fin, Short Fin with insulated tip. Unsteady State Heat Transfer Conduction: Transient heat conduction-lumped system analysis and use of Heisler charts.

Unit 3 Convective heat transfer **16**

Convective Heat Transfer: Forced Convection: External Flows-Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for flow over-flat plates, cylinders. Internal Flows: -Division of internal flow through concepts of Hydrodynamic and Thermal entry lengths – Use of empirical relations for horizontal pipe flow. Free Convection: -Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for plates and cylinders in horizontal and vertical orientation.

Unit 4 Heat transfer with phase change & Radiation **17**

Heat transfer with phase change: Boiling- Pool boiling – Regimes, condensation – film wise and dropwise condensation-simple problems.

Radiation Heat Transfer: – Thermal radiation – Emission characteristics - laws of radiation - Black and Gray bodies – shape factor-radiation exchange between surfaces - Radiation shields

Unit 5 Heat Exchangers 08

Heat Exchangers: Classification of heat exchangers – Overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.

Prescribed Textbook:

1. R.C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer. New Age International, 5th Ed.2017, ISBN13: 978-1781831038.

Reference Books:

1. Incropera, Fundamentals of Heat and Mass transfer. Wiley India, 8th Ed,2017 ISBN: 978-1-119-35388-1
2. J.P.Holman, Heat Transfer. TMH, 10th Ed. 2010, ISBN-13: 978-0073529363.
3. Arora and Domkunduwar/ A course in Heat and Mass transfer /Dhanpathrai and sons.2007, ISBN-13: 978- 8177000290
4. P.K.Nag, Heat Transfer. TMH, 3rd Ed. 2011, ISBN-13: 978-0070702530

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC61T.1	3	2	1	1	-	-	-	-	-	-	-	1	1
24AMEC61T.2	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.3	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.4	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.5	3	3	2	2	-	-	-	-	-	-	1	1	1

Ch. Santosh Kumar
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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Heat Transfer
Category: PC
Year: III
Semester: II
Course Code: 24AMEC61T
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart the basic laws of conduction, convection, radiation heat transfer and their applications
2. To provide knowledge about heat flow in various systems.
3. To familiarize the convective heat transfer concepts.
4. To understand the principles of phase change processes and radiation heat transfer.
5. To make conversant about heat transfer in various heat exchangers

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the modes of heat transfer
2. Apply the knowledge of conduction heat transfer for various geometry.
3. Calculate heat transfer rates in forced and free convection.
4. Calculate the heat transfer rates during phase change process and radiation.
5. Evaluate the performance of the heat exchangers

Unit 1 Introduction to conduction heat transfer **8**

Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer – General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates. Boundary and initial conditions.

Unit 2 One dimensional steady state & transient heat conduction **14**

One Dimensional Steady State Heat Conduction: In homogeneous slabs, hollow cylinders, Critical radius of insulation-Extended surface (fins) Heat Transfer – Long Fin, Short Fin with insulated tip. Unsteady State Heat Transfer Conduction: Transient heat conduction-lumped system analysis and use of Heisler charts.

Unit 3 Convective heat transfer **16**

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Unit 4 Heat transfer with phase change & Radiation **17**

Heat transfer with phase change: Boiling- Pool boiling – Regimes, condensation – film wise and dropwise condensation-simple problems.

Radiation Heat Transfer: – Thermal radiation – Emission characteristics - laws of radiation - Black and Gray bodies – shape factor-radiation exchange between surfaces - Radiation shields

Unit 5 Heat Exchangers **08**

Heat Exchangers: Classification of heat exchangers – Overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods.

Prescribed Textbook:

1. R.C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer. New Age International, 5th Ed.2017, ISBN13: 978-1781831038.

Reference Books:

1. Incropera, Fundamentals of Heat and Mass transfer. Wiley India, 8th Ed,2017 ISBN: 978-1-119-35388-1
2. J.P.Holman, Heat Transfer. TMH, 10th Ed. 2010, ISBN-13: 978-0073529363.
3. Arora and Domkunduwar/ A course in Heat and Mass transfer /Dhanpathrai and sons.2007, ISBN-13: 978- 8177000290
4. P.K.Nag, Heat Transfer. TMH, 3rd Ed. 2011, ISBN-13: 978-0070702530

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC61T.1	3	2	1	1	-	-	-	-	-	-	-	1	1
24AMEC61T.2	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.3	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.4	3	2	1	2	-	-	-	-	-	-	-	1	1
24AMEC61T.5	3	3	2	2	-	-	-	-	-	-	1	1	1

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Metrology and Measurements
Category:	PC
Year:	III
Semester:	II
Course Code:	24AMEC62T
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To explain the system of limits, fits &tolerances and design of gauges.
2. To identify the use of flatness and surface gauges.
3. To know the measurement of screw thread, Gear profiles.
4. To describe the Measurement of Displacement and Strain.
5. To illustrate the measuring process of Pressure, Force and Torque.

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the concepts of limits, fits, limit gauges and linear & angular measuring instruments
2. Explain the concepts of flatness and surface roughness measurements.
3. Describe the measurement of screw thread and Gear profiles.
4. Summarize the measuring process of Displacement and Strain
5. Summarize the measuring process of Pressure, Force and Torque

Unit 1 Limits and Fits **18**

Limits fits and tolerances, hole basis and shaft basis system, interchangeability.

Linear and Angular Measurement: Linear measuring instruments: Vernier instruments, micrometers, slip gauges, tool makers microscope.

Angular measurements: bevel protractor and angle dekkor, rollers and spheres used to determine the tapers.

Limit Gauges and Gauge Design: Plug, Ring, Snap, Gap, Taper gauges. Taylor's principle. Design of Go and No-Go gauges.

Unit 2 Screw Thread and Gear Measurement **09**

Screw thread measurements: Elements of threads, errors in screw threads, various methods for measuring external and internal screw threads, screw thread gauges.

Gear Measurement: Gear tooth terminology, measurement of gear elements-run out, lead, pitch backlash, profile, pressure angle, tooth thickness, diameter of gear, constant chord and base tangent method. Coordinate Measuring Machine (CMM)- Construction and features.

Unit 3 Flatness and Surface Roughness measurement **09**

Flatness Measurement: Measurement of flatness – straight edges – surface plates, optical flat and autocollimators.

Surface Roughness Measurement: Terminology systems, differences between surface roughness and surface waviness- Numerical assessment of surface finish - CLA, R.M.S Value-Ra, Rz values, Methods of measurement of surface finish-profilograph, Talysurf.

Unit 4 Measurement of Displacement and Strain **09**

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo-electric, inductive, capacitance, resistance, ionization and photoelectric transducers.

Measurements of Strain: Various types of electrical strain gauges, gauge factor, method of usage of resistance strain gauge for bending, compressive and tensile strains.

Unit 5 Measurement of Force, Torque and Pressure **12**

Measurement of Force: Direct method - analytical balance, platform balance; elastic members – load cells, cantilever beams and proving rings.

Measurement of Torque: Torsion bar dynamometer and absorption dynamometer.

Measurement of Pressure: Standards and calibration, basic methods of pressure measurement - Bourdon tube & Diaphragm, dead weight gauges and manometers.

Prescribed Textbooks:

1. Engineering Metrology, R.K. Jain, Khanna Publishers, special edition 2022. ISBN-13: 978-8174091536
2. Basic Principles - Measurements and Control Systems. S. Bhaskar, Anuradha Publications, 2007. ISBN-13: 978-8189638900

Reference Books:

1. Mechanical Measurements, Beckwith, Marangoni, Linehard, PHI, 2013, ISBN-13: 978-9332518520
2. Metrology & Measurement, Anand K Bewoor & Vinay A Kulkarni, 15/e, McGrawHill, 2017. ISBN-13: 978-0070140004
3. Mechanical Measurements & Control, D.S. Kumar, Metropolitan Publishers, 5/e, 2015.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC62T.1	3	2	1	1	-	-	-	-	-	-	-	-	2
24AMEC62T.2	3	2	1	1	-	-	-	-	-	-	-	-	2
24AMEC62T.3	3	2	1	1	-	-	-	-	-	-	-	-	2
24AMEC62T.4	3	2	1	1	-	-	-	-	-	-	-	-	2
24AMEC62T.5	3	2	1	1	-	-	-	-	-	-	-	-	2

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	CAD/CAM
Category:	PC
Year:	III
Semester:	II
Course Code:	24AMEC63T
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the fundamentals of CAD/CAM, Computer Graphics and its Transformation.
2. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication
3. Understand the importance of NC/CNC systems, machine tool structures, control techniques, and the fundamentals of CNC part programming including APT-based methods.
4. Understand the importance of Group Technology, Flexible Manufacturing System and Computer Aided Quality Control.
5. Understand the Computer-aided process planning and production planning systems, along with emerging trends such as reconfigurable, sustainable, and lean manufacturing.

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the fundamental concepts of CAD/CAM and computer graphics, including coordinate systems and geometric transformations.
2. Summarize and differentiate key geometric modeling techniques such as wireframe, surface, and solid modeling.
3. Write NC and CNC part programs using standard codes, canned cycles, compensation techniques, and APT-based programming for various machining operations.
4. Explain the significance of Group Technology, Flexible Manufacturing System and Computer-Aided Quality Control,
5. Summarize the concepts of computer-aided process planning methods, computer-integrated production planning systems, and emerging trends in modern manufacturing such as reconfigurable, sustainable, and lean manufacturing.

Unit 1 Introduction To Computer Graphics **08**

Introduction to CAD and CAM- Elements of CAD-Computers in Industrial Engineering-Product Cycle-CAD/CAM.

Computer Graphics: Co-ordinate systems, Graphics package functions, 2D and 3D transformations, clipping, hidden line / surface removal color, shading.

Unit 2 Curve Representation **12**

Geometric Modeling: Representation techniques, Parametric and non-parametric representation, various construction methods, wire frame modeling, synthetic curves and their representations, surface modeling, synthetics surfaces and their representations. Solid modeling, solid representation, fundamentals, introduction to boundary representations, constructive solid geometry representations. Introduction to CAD file formats – IGES and STEP files.

Unit 3 Numerical Control 12

Numerical Control: NC, NC Modes, NC Elements, NC Machine tools and their structure, Machining center (working Principle for 3 Axis) and features. Controls in NC, CNC systems, DNC systems

CNC Part Programming: Fundamentals, NC word, NC Nodes, Computed assisted part programming, APT programming (simple programs)

Unit 4 Group Technology, Flexible Manufacturing System 12

Group Technology & FMS: Part Family, Classification and Coding, advantages & limitations, Group technology machine cells, benefits. FMS: Introduction, components of FMS, material handling systems, Computer control systems, advantages.

Unit 5 Computer Integrated Production Planning 08

Computer Aided Processes Planning: Retrieval type and Generative type, benefits

Computer integrated production planning: Capacity planning, shop floor control, MRP-I, MRP- II, CIMS benefits.

Prescribed Textbook:

1. P. N. Rao, CAD/CAM: Principles and applications, 3/e, Tata McGraw-Hill, Delhi, 2017.

Reference Books:

1. Ibrahim Zeid, R.Siva Subramanian, CAD/CAM: Theory and Practice, 2/e, Tata McGraw-Hill, Delhi, 2009.
2. P. Radhakrishnan, S. Subramanyan& V. Raju, CAD/CAM/CIM, 3/e, New Age International Publishers, 2008.
3. Computer Aided Manufacturing, 3/e, Tien Chien Chang, Pearson, 2008.
4. Ibrahim Zeid, R.Siva Subramanian, CAD/CAM: Theory and Practice, 2/e, Tata McGraw-Hill, Delhi, 2009.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC63T.1	2	2	1	1	-	-	-	3	-	-	-	2	2
24AMEC63T.2	2	2	1	1	-	-	-	3	-	-	-	3	3
24AMEC63T.3	3	3	3	3	-	-	-	3	-	-	-	3	3
24AMEC63T.4	2	2	1	1	-	-	-	3	-	-	-	2	2
24AMEC63T.5	2	2	1	1	-	-	-	3	-	-	-	2	2

(S.M. SALEEMUDDIN)
Course Coordinator

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Smart Manufacturing
Category: PE
Year: III
Semester: II
Course Code: 24AMEC6AT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the concepts, evolution, and significance of Smart Manufacturing and Industry 4.0 in modern production systems.
2. To provide exposure to data-driven manufacturing, including the use of analytics and artificial intelligence for intelligent decision-making.
3. To familiarize students with smart sensors, RFID, and blockchain technologies used in connected manufacturing environments
4. To present the principles of Digital Twin and simulation tools for virtual manufacturing and system optimization.
5. To create awareness of sustainable and green manufacturing practices and their role in future industrial systems.

Course Outcomes:

At the end of the course, the student will be able to,

1. Explain the structure and working of Smart Manufacturing systems, including Industry 4.0 and IIoT components.
2. Analyze manufacturing problems using data analytics and AI concepts to support maintenance and quality decisions.
3. Apply smart sensing, RFID, and blockchain concepts to real-world manufacturing and supply-chain scenarios.
4. Demonstrate the use of Digital Twin and simulation concepts for design validation and performance evaluation.
5. Assess the impact of sustainable and green manufacturing practices on energy efficiency and environmental performance.

Unit 1 **13**

Introduction to Smart Manufacturing: Definition, evolution and importance of Smart Manufacturing, Industry 4.0 and its impact on manufacturing, traditional vs. smart manufacturing, key technologies in Smart Manufacturing.

Cyber-Physical Systems and Industrial IoT (IIoT): Basics of Cyber-Physical Systems (CPS), IoT in manufacturing, smart sensors and actuators, industrial communication and network protocols – MQTT, OPC-UA, Modbus and Ethernet/IP in smart manufacturing systems.

Unit 2 **12**

Data Analytics and Artificial Intelligence in Manufacturing: Role of Big Data in Manufacturing, Machine Learning & Deep Learning for Smart Manufacturing, Predictive Maintenance and Anomaly Detection, Digital Twin Technology

Automation & Robotics in Smart Manufacturing: Industrial Automation: PLCs, SCADA, and DCS, Autonomous Robots and Cobots (Collaborative Robots), Additive Manufacturing (3D Printing), Case Studies of Smart Factories.

Unit 3 **13**

Cloud Computing and Edge Computing in Manufacturing: Introduction to Cloud Computing for Manufacturing, Edge and Fog Computing in Real-time Manufacturing Systems, Cloud-based Manufacturing Execution Systems (MES).

Smart Sensors, RFID, and Block chain in Manufacturing: Role of Smart Sensors and RFID in Inventory Management, Blockchain for Secure Supply Chains Smart Contracts and Decentralized Manufacturing Systems.

Unit 4 **12**

Digital Twin & Simulation in Manufacturing: Digital Twin technology and virtual prototyping, simulation software for Smart Manufacturing, NSCAD software exposure, augmented reality (AR) and virtual reality (VR) in Industry 4.0 applications.

Cybersecurity in Smart Manufacturing: Threats and risks in Smart Manufacturing, cybersecurity frameworks for industrial systems, best practices for securing IoT and IIoT devices.

Unit 5 **10**

Sustainable and Green Manufacturing: Energy Efficiency in Smart Manufacturing, Sustainable Supply Chain Management, Role of AI in Green Manufacturing

Case Studies and Future Trends: Case Studies of Leading Smart Manufacturing Companies, Emerging Technologies in Smart Manufacturing, Future of Industry 5.0 and Beyond

NOTE: A case study report on Industry with smart manufacturing techniques

Prescribed Textbook:

1. Industry 4.0, Smart Manufacturing, and Industrial Engineering: Challenges and Opportunities, ISBN-13: *978-1032753270,* CRC Press Taylor & Francis Group

Reference Books:

1. Introduction To Smart Manufacturing And Automation Dr. Rajkumar. E Namya Press (29 March 2024); 213, Vardan Hosue 7/28 Ansari Road Daryganj Delhi 110002.
2. Smart Manufacturing by Michael Deng (Author), Colin Koh Kindle Edition (2023)
3. Smart manufacturing by Kamalakar Mutalik The Righte order (2023)
4. Green Manufacturing Processes and Systems - J. Paulo Davim/Springer 2013

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6AT.1	3	2	–	–	2	2	–	–	1	–	2	2	1
24AMEC6AT.2	3	3	2	2	2	–	–	–	–	–	2	3	2
24AMEC6AT.3	2	2	3	–	3	1	–	1	–	–	1	3	3
24AMEC6AT.4	2	2	3	3	3	–	–	–	1	–	2	3	2
24AMEC6AT.5	2	1	2	–	–	3	2	–	–	2	2	2	1

Course Coordinator

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Additive Manufacturing
Category:	PE
Year:	III
Semester:	II
Couse Code:	24AMEC6BT
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To familiarize techniques for processing of CAD models for rapid prototyping
2. To explain fundamentals of rapid prototyping techniques
3. To demonstrate appropriate tooling for rapid prototyping process
4. To focus Rapid prototyping techniques for reverse engineering
5. To train Various Pre – Processing, Processing and Post Processing errors in RP Processes

Course Outcomes:

At the end of the course, the student will be able to

1. Explain the fundamentals of prototyping, the need for rapid prototyping in product development, and differentiate RP from traditional prototyping and CNC machining techniques.
2. Describe and compare solid-based and liquid-based rapid prototyping systems such as SLA, SGC, FDM, and LOM with respect to their principles, materials, advantages, limitations, and applications.
3. Analyze powder-based and other advanced RP systems including SLS, LENS, EBM, 3DP, BPM, and SDM, and evaluate their suitability for different engineering applications.
4. Explain and apply the concepts of rapid tooling and reverse engineering, including tooling classifications, RE processes, scanning techniques, and geometric model development.
5. Identify and assess errors occurring in RP processes and demonstrate the application of RP technologies in design, tooling, reverse engineering, and medical engineering domains.

Unit 1 Introduction to rapid prototyping **09**

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

Unit 2 Solid and Liquid Based RP Systems **09**

Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications.
Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.
Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications.
Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Unit 3 Powder Based RP Systems **10**

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three-Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Unit 4 Rapid tooling and Errors in RP processes and RP applications **12**

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Unit 5 Reverse engineering **06**

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Prescribed Textbook:

1. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e, Edition, World Scientific Publishers, 2003.

Reference Books:

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling, Springer, London 2001.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6BT.1	3	3	3	2	2	-	-	-	-	-	-	-	3
24AMEC6BT.2	3	3	3	2	2	-	-	-	-	-	-	-	3
24AMEC6BT.3	3	3	3	2	2	-	-	-	-	-	-	-	3
24AMEC6BT.4	3	3	3	2	2	-	-	-	-	-	-	-	3
24AMEC6BT.5	3	3	3	2	2	-	-	-	-	-	-	-	3

Venkateshwar
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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Automobile Engineering
Category:	PE
Year	III
Semester:	II
Course Code:	24AMEC6CT
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart the knowledge on I C Engine, Automobile chassis and Body.
2. To familiarize different fuel systems and types of ignitions systems. .
3. To gain knowledge on Principles of Steering system and Suspension system.
4. To awareness about on wheels, Tyres and braking system.
5. To provide insight on Automobile electrical system and gain knowledge on Safety Systems used in automobiles

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the different parts and develop the automobile systems to analyze engine components
2. Identify the working of various parts in ignition system to apply the different vehicles and design the ignition and fuel injection systems.
3. Demonstrate how the steering and the suspension systems works, types of steering and suspension systems and its applications.
4. Recognize the different types of wheels and braking systems. Choose the suitable tyres and brakes for different applications.
5. Utilize different electrical systems in automobiles. Apply advanced electrical circuits. Create advanced Global Positioning System (GPS), Hybrid vehicle, Fuel Cell and Safety systems in automobiles.

Unit 1 Introduction to vehicle structure and engine components **14**

Define automobile- types of automobile engines- Components of a four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive- engine construction- Specifications- Types - Oil pumps- Electric Oil Pumps, Variable Displacement Oil Pumps-Dry Sump Pumps -Oil Filters- Cartridge Oil Filters, Spin-On Oil Filters, Magnetic Oil Filters.

Unit 2 Ignition and fuel supply systems **12**

Ignition system -Coil and Magneto - Spark plug - Distributor – Electronic ignition system -Simple Fuel system in diesel engine Simple Carburetor - Fuel pumps –Mechanical and Electrical fuel pumps- Mono point and Multi point Fuel injection systems– Unit Injector – Nozzle types –Single Point and Multi-Point Nozzles- Electronic Fuel Injection system (EFI) – Gasoline Direct Injection (GDI)

Unit 3 Steering and suspension system **11**

Principle of steering -Steering Geometry- camber, castor, king pin inclination, toe-in and toe-out - wheel alignment - Steering linkages – Steering gearboxes- Rack and Pinion, Recirculating Ball, Worm and Nut - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers.

Unit 4 Wheels, Tyres and Braking System **10**

Function of Wheels and Tyres - Construction - Type and specification - Tyre wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders- Antilock braking system.

Unit 5 Electrical systems, advances and Safety Systems in automobile engineering **12**

Battery-General electrical circuits- Active Suspension System (ASS) - Electronic Brake Distribution (EBD) – Electronic Stability Program (ESP), Traction Control System (TCS) - Global Positioning System (GPS), Hybrid vehicle, Fuel Cell.

Safety System: Air bag restraint system, voice warming system, seat belt system, anti-theft system.

Prescribed Textbook:

1. A Textbook of Automobile Engineering –R.K.Rajput, Laxmi Publication(P) LTD, 2012, ISBN-81-70089913,9788170089919

Reference Books:

1. Kirpal Singh, Automobile Engineering –Vol.1, standard publisher's distributors, 14th Ed.2019 & 2021. ISBN-13: 9788180142420, ISBN-10: 8180142426
2. Kirpal Singh, Automobile Engineering –Vol.2, standard publisher's distributors, 14th Ed.2020 & 2021. ISBN-13: 9788180142062, ISBN-10: 818014206X.
3. R.B. Gupta, Automobile Engineering, Satya Prakashan (Deepak Handa) Publications. 2020 11th edition. ISBN-13: 978-9351923114 and ISBN-10: 9351923118

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6CT.1	2	2	2	2	-	-	1	-	1	-	1	2	1
24AMEC6CT.2	2	2	2	2	-	-	1	-	1	-	1	2	1
24AMEC6CT.3	2	2	2	2	-	-	1	-	1	-	1	2	1
24AMEC6CT.4	2	2	2	2	-	-	1	-	1	-	1	2	1
24AMEC6CT.5	2	2	2	2	-	-	1	-	1	-	1	2	1

S. NAGENDRA
COURSE CO-ORDINATOR.

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Design of Transmission Systems
Category: PE
Year: III
Semester: II
Course Code: 24AMEC6DT
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To explain the various elements involved in a transmission system.
2. To explain the design procedures of different types of joints.
3. To do Design the system based on the input and the output parameters.
4. To produce working drawings of the system involving pulleys, gears, clutches and brakes.
5. To design concepts of IC engine parts like Pistons, connecting rod and crank shaft.

Course Outcomes:

At the end of the course, the student will be able to

1. Design and select suitable flexible power transmission elements and analyze the load conditions, and performance requirements.
2. Design procedure for keys and cotter joints.
3. Analyze and design different types of gears by evaluating their efficiency, ensuring reliable performance in mechanical power transmission systems.
4. Create speed reducers and multi-speed gearboxes by developing structural and ray diagrams, selecting appropriate gear combinations for various mechanical applications
5. Design the different IC engine parts subjected to different loads.

Unit1 Flexible power transmission systems **13**

Design of flexible power transmission systems: Flat belts and pulleys, V-belts and pulleys, chain drives and wire ropes.

Unit 2 Design of Keys, Cotter and Knuckle Joints **12**

Keys: Design of sunk, saddle, Kennedy and Woodruff keys.
Joints: Design of socket and spigot joint, sleeve and cotter joint, gib and cotter joint, and knuckle joint.

Unit 3 Helical, bevel and worm gears **13**

Parallel helical gears – kinematics, tooth proportions; force analysis, stresses in helical gear teeth, Lewis strength equation and design of helical gears, crossed helical gears. Straight bevel gears – force analysis, stresses and design of bevel gears. Worm gearing – kinematics, forces, friction, efficiencies and design considerations.

Unit 4 Design of gear boxes **12**

Design of speed reducers, design of multi-speed gear boxes for machine tools, structural and ray diagrams.

Unit 5 Design of IC engine components **13**

Design of friction clutches – single plate and multi plate clutches. Design of brakes – shoe brake, band brake and disc brake. Design considerations for flywheels.

Prescribed Textbook:

1. Mechanical Engineering Design, Joseph Edward Shigley and Charles, R. Mischke, McGraw –Hill International Editions, 2000. ISBN 13: 9780073659398.

Reference Books:

1. Design Data: Data Book of Engineers by PSG College-Kalaikathir Achchagam – Coimbatore, ISBN-13: 9788192735504
2. Gear Handbook: The Design, Manufacture and Application of Gears, ISBN-13. 978-0070179035
3. Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill, 2001 , ISBN-13. 978-9339221126
4. Robert L. Norton, Machine Design: An Integrated Approach, 6th Edition, Pearson Education, 2022. ISBN-13: 9780135214800.
5. P. Kannaiah, Machine Design, Scitech Publications, 2010. ISBN-13: 9788183711517.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6DT.1	3	3	3	2	3	-	-	1	1	2	2	3	3
24AMEC6DT.2	3	3	3	3	3	--	-	1	1	1	2	3	3
24AMEC6DT.3	3	3	3	3	3	-	-	1	1	1	2	3	3
24AMEC6DT.4	3	3	3	3	3	-	-	1	1	2	2	3	3
24AMEC6DT.5	3	3	3	3	3	-	-	1	1	2	2	3	3

(N. Keerthi)

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Modern Machining Processes
Category:	PE
Year:	III
Semester:	II
Course Code:	24AMEC6ET
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To acquire basic knowledge on the latest technologies being used in manufacturing industries as part of modernization of industries.,
2. To learn about the importance of basic principles of Manufacturing Systems and also, they will know about the differences between conventional and un-conventional machining process with the help of various advanced manufacturing techniques like USM, AJM, ECG, ECH, ECD, ECM, EDM, PAM, EBM ,LSB and PAM.

Course Outcomes:

At the end of the course, the student will be able to

1. Summarize the concept of need for the MMP and working of USM processes with its process parameters.
2. Understand the working of AJM, WAJM and WJM processes with its process parameters.
3. Understand the working of ECM, ECG, ECH and ECD processes with its process parameters.
4. Understand the working of EDM, EDG and WEDM processes with its process parameters.
5. Understand the working concepts of EBM, LBM, PAM process processes with its process parameters.

Unit 1 Introduction To MMP- USM **11**

Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection. Materials. Applications.

Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent developments.

Unit 2 Mechanical Processes **10**

Abrasive jet machining, water jet machining and abrasive water jet machining – basic principles, equipment, process variables, mechanics of material removal, MRR, applications in micro & precision engineering and limitations.

Unit 3 Electro – Chemical Processes **10**

Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate. Fundamentals of chemical machining, principle, advantages and applications.

Unit 4 Thermal Metal Removal Processes – I **11**

General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM principles, and applications.

Unit 5 Thermal Metal Removal Processes -II **11**

Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut. Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

Prescribed Textbook:

1. M. Vijay.K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd., New Delhi (2002) ISBN 81-7764-294-4.

Reference Books:

1. Benedict. G.F. "Nontraditional Manufacturing Processes" Marcel Dekker Inc., New York (1987) - ISBN 0824773527
2. Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill, New Delhi (1980). ISBN 978-0070965539

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6ET.1	3	2	2	3	1	2	-	-	-	-	-	-	2
24AMEC6ET.2	3	3	3	3	1	2	-	-	-	-	-	-	2
24AMEC6ET.3	3	2	3	3	1	2	-	-	-	-	-	-	2
24AMEC6ET.4	3	3	3	3	1	2	-	-	-	-	-	-	2
24AMEC6ET.5	3	3	3	3	1	2	-	-	-	-	-	-	2

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ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Operations Research
Category:	PE
Year:	III
Semester:	II
Couse Code:	24AMEC6FT
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To enable the students to the nature and scope of various decision making situations within business contexts, understand and apply operations research techniques to industrial applications
2. To learn the fundamental techniques of Operations Research and to choose a suitable OR technique to solve problem

Course Outcomes:

At the end of the course, the student will be able to

1. Solve the Linear Programming Problems using Graphical, Simplex and Artificial Variable Techniques
2. Solve the Transportation, Assignment
3. Solve the problems of Game Theory
4. Analyze the waiting lines in real life situations
5. Apply the inventory models related to market and Dynamic Programming technique for complex problems

Unit 1 **16**

Development – Definition – applications. Linear Programming Problem Formulation – Graphical solution – Simplex method – Big-M method, Duality Principle

Unit 2 **16**

Transportation Problem: Formulation, initial basic feasible solutions using North-West Corner Method, Least Cost Method and Vogel's Approximation Method, optimal solution, unbalanced transportation problem and degeneracy.

Assignment Problem: Formulation, optimal solution and variants of assignment problem.

Unit 3 **12**

Theory Of Games: Introduction – Minimax - Maximin – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – m X 2, 2 X n & m x n games - Graphical method, Dominance principle

Unit 4 **08**

Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite queue length models

Unit 5 **12**

Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks. Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic programming shortest path problem – linear programming problem

Prescribed Textbook:

1. Er. Prem Kumar Gupta and Dr. DS Hira, Operations Research, S Chand Publisher, ISBN – 13 9788121902816

Reference Books:

1. S.D. Sharma, Operations Research, Kedarnath and Ramnath Publications
2. Taha, Introduction to Operations Research. PHI

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6FT.1	3	2	1	2	-	-	1	-	-	-	-	1	2
24AMEC6FT.2	3	2	1	2	-	-	1	-	-	-	-	1	2
24AMEC6FT.3	3	2	1	2	-	-	1	-	-	-	-	1	2
24AMEC6FT.4	3	3	2	2	-	-	1	-	-	-	-	1	1
24AMEC6FT.5	3	2	1	2	-	-	1	-	-	-	-	1	1

(CRVNR. SURYA PRAKASH)

COURSE CO-ORDINATOR

K. Ajay Kumar Reddy

B. Santosh Kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Computational Fluid Dynamics
Category:	PE
Year:	III
Semester:	II
Course Code:	24AMEC6GT
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Prerequisites: Fluid Mechanics, Heat Transfer and Engineering Mathematics.

Course Objectives:

1. To introduce the basic concepts and applications of Computational Fluid Dynamics (CFD).
2. To understand the governing equations of fluid flow and their classifications.
3. To develop knowledge of basic discretization and grid generation techniques used in CFD.
4. To familiarize students with basic CFD solution algorithms and boundary conditions.
5. To provide exposure to CFD software tools and engineering applications of CFD.

Course Outcomes:

At the end of the course, the student will be able to

1. Explain the basic concepts and applications of Computational Fluid Dynamics.
2. Understand the governing equations and basic discretization methods used in CFD.
3. Identify suitable grid generation techniques for computational modeling.
4. Apply basic CFD solution algorithms and boundary condition concepts.
5. Use CFD software tools for analyzing simple engineering fluid flow problems.

Unit 1 Introduction **12**

Introduction to Computational Fluid Dynamics, applications of CFD in engineering, fluid flow governing equations, finite control volume, basic concepts of compressible and incompressible flows. Introduction to finite difference and finite volume methods, explicit and implicit methods, basic concepts of stability and convergence.

Unit 2 Governing Equations and Discretization **10**

Conservation equations of mass, momentum, and energy, conservation and non-conservation forms, classification of partial differential equations – elliptic, parabolic and hyperbolic equations. Basic discretization concepts.

Unit 3 Numerical Methods and Grid Generation **12**

Basic finite difference approximations, explicit and implicit schemes, one-dimensional and two-dimensional discretization concepts. Need for grid generation, structured and unstructured grids, grid quality and basic grid generation techniques.

Unit 4 CFD Solution Techniques **12**

Pressure-velocity coupling methods, SIMPLE and PISO algorithms, boundary conditions in CFD, convergence criteria and error analysis. Introduction to CFD software tools and preprocessing/postprocessing techniques.

Unit 5 CFD Applications **10**

Applications of CFD in fluid flow and heat transfer problems, flow through pipes and ducts, external flow over bodies, heat exchangers and aerospace applications. Introduction to parallel computing and industrial case studies.

Prescribed Textbook:

1. John .D. Anderson "Computational Fluid Dynamics", McGraw Hill

Reference Books:

1. J Blazek, "Computational Fluid Dynamics: Principles and Applications" Elsevier.
2. Chow CY," Introduction to Computational Fluid Dynamics", John Wiley, 1979
3. Hoffmann, K.A: Computational Fluid Dynamics for Engineers, Engineering Education System, Austin, Tex., 1989

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6GT.1	3	2	1	-	-	-	-	-	-	-	2	2	1
24AMEC6GT.2	3	3	2	1	1	-	-	-	-	-	2	2	2
24AMEC6GT.3	3	2	2	1	2	-	-	-	-	-	2	2	3
24AMEC6GT.4	3	3	2	1	3	-	-	1	-	-	2	2	3
24AMEC6GT.5	3	3	2	2	3	1	-	1	1	-	3	3	3

Dr. B. Devaseenaik
(Course Coordinator)

K. Ajay kumar Reddy

B. Santosh kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Finite Element Methods
Category:	PE
Year:	III
Semester:	II
Course Code:	24AMEC6HT
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To learn basic principles of finite element analysis procedure.
2. To gain knowledge of the concepts of Nodes and elements
3. To know the theory and characteristics of finite elements that represent engineering structures.
4. To apply finite element solutions to structural, thermal, and dynamic problems.
5. To develop the knowledge and skills to evaluate finite element analyses and apply design analysis Effectively.

Course Outcomes:

At the end of the course, the student will be able to

1. Identify mathematical models to solve common engineering problems by applying the finite element method and able to solve one dimensional problem like bars.
2. Derive element matrices to analyze the stresses in beams and truss
3. Analyze the plain stress, plain strain and axis-symmetric problems by formulating FE characteristic equations for two dimensional elements.
4. Analyze the Curved boundary elements using iso-parametric elements & heat transfer problems by formulating the FE characteristic equations
5. Identify how the finite element method expands beyond the structural domain, for problems involving dynamics and Torsion problems

Unit 1 Introduction to finite element methods **15**

Introduction to FEM: Introduction to finite element methods for solving field problems, applications, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, Formulation of Finite Element Equations.

One dimensional Problems: Finite element modelling of ID bar elements coordinates and shape functions. Pascal's Triangle, Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Unit 2 1D Analysis of Trusses and Beam **12**

Analysis of trusses: Stiffness Matrix for 1D truss element, Stress Calculations and Problems with maximum of three elements.

Analysis of beams: Element Stiffness Matrix and Load vector for 1 D beam element, Hermite shape functions and simple problems.

Unit 3 2D-Analysis **10**

Finite element modeling of two-dimensional stress analysis with constant strain triangles and treatment of boundary conditions. Estimation of load Vector, Stresses.

Finite element modeling of axi-symmetric solids subjected to axi-symmetric loading with triangular elements.

Unit 4 Quadrilateral Elements & Thermal Analysis **12**

Quadrilateral Elements: Isoparametric, Sub parametric and Super parametric elements, Modelling of 4 noded and 8 noded quadrilateral elements and simple problems. Numerical Integration.

Steady state heat transfer analysis: One dimensional analysis of composite slab and fin.

Unit 5 Dynamic analysis **10**

Dynamic analysis: Analysis of a 1D uniform shaft subjected to torsion – Simple problems

Dynamic analysis: Formulation of finite element model, element – mass matrices, evaluation of Eigen values and Eigen vectors for a bar and shaft.

Prescribed Textbook:

1. Introduction to Finite Element in Engineering, T. Chandraputla, Ashok Belegundu, Pearson Publications, 4/e, 2011.

Reference Books:

1. An introduction to the Finite Element Method, J N Reddy, McGraw – Hill, New York, 1993.
2. The Finite Element Methods in Engineering, Elsevier Butterworth -Heinemann, S.S.Rao, 2/e, 2011

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC6HT.1	3	3	3	3	-	-	1	-	-	-	2	2	3
24AMEC6HT.2	3	3	3	3	-	-	1	-	-	-	1	3	2
24AMEC6HT.3	3	3	3	3	-	-	1	-	-	-	-	2	2
24AMEC6HT.4	3	3	3	3	-	-	1	-	-	-	-	1	1
24AMEC6HT.5	3	3	3	3	-	-	1	-	-	-	-	2	2

Ajay Kumar Reddy. K
(Course - Coordinator)

K. Ajay Kumar Reddy

B. Santosh Kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Heat Transfer Lab
Category:	PC
Year	III
Semester	II
Course Code:	24AMEC61L
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To gain insight various equipment undergoing different modes of heat transfer.
2. To impart the knowledge of heat exchangers.
3. To familiarize about transient heat conduction and heat pipe apparatus.
4. To provide practical knowledge on boiling and condensation equipment.

Course Outcomes:

At the end of the course, the student will be able to

1. Calculate the thermal conductivity of metal bar, insulating powder, lagged pipe and composite wall.
2. Calculate the fin efficiency, effectiveness and performance of heat exchangers.
3. Calculate convective heat transfer coefficient in free, forced convection and drop and film wise condensation.
4. Calculate the Stefan Boltzmann constant and emissivity of gray body.
5. Calculate the Critical heat flux for pool boiling.

List of experiments **12 Weeks**

1. Thermal Conductivity of metal (conductor)
2. Thermal conductivity of insulating powder through Concentric Sphere
3. Overall heat transfer co-efficient through Composite Slab
4. Heat transfer coefficient in natural convection
5. Heat transfer coefficient in forced convection
6. Heat transfer from pin-fin
7. Emissivity of a gray body through Emissivity apparatus
8. Stefan Boltzman constant determination.
9. Parallel and counter flow heat exchanger
10. Critical heat flux determination in pool boiling process.
11. Thermal conductivity of insulating material through lagged pipe apparatus
12. Heat transfer in drop and film wise condensation
13. Demonstration on Formulation of Non-Dimensional Parameters

Note: Any 10 out of 13 experiments can be conducted.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC61L.1	3	3	1	2	-	-	-	-	1	-	1	2	2
24AMEC61L.2	3	3	1	2	-	-	-	-	1	-	1	2	2
24AMEC61L.3	3	3	1	2	-	-	-	-	1	-	1	2	2
24AMEC61L.4	3	3	1	2	-	-	-	-	1	-	1	2	2
24AMEC61L.5	3	3	1	2	-	-	-	-	1	-	1	2	2

S. NAGENDRA
Course co-ordinator

K. Ajay kumar Reddy

B. Santosh kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Metrology & Measurements Lab
Category:	PC
Year:	III
Semester:	II
Course Code:	24AMEC62L
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course objectives:

1. To understand the measurement of various parameters of given work pieces by different instruments.
2. To understand the working of pressure gauge, LVDT, Strain gauge, transducers, thermocouples and RTD.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply the procedures to measure length, width, depth and bore diameters by various linear instruments.
2. Measure external tapers and surface roughness by different instruments
3. Measure the thread parameters using Floating Carriage Thread micrometer and Tool makers Microscope
4. Examine and test on different types of instruments and transducers.
5. Learn and remember the working principle of different types of transducers

Metrology **6 Weeks**

1. Measurement of lengths, heights, diameters by Vernier calipers, micrometers etc.
2. Use of Gear Tooth Vernier calipers for checking the chordal addendum and chordal height of spur gear.
3. Thread measurement by Tool makers microscope.
4. Angle and taper measurements by Bevel protractor, Sine bars, etc.
5. Use of spirit level in finding the flatness of surface plate.
6. Thread measurement by two wire/ three wire method.
7. Surface roughness measurement by Talysurf instrument.

NOTE: All the experiments need to perform.

Measurements **7 Weeks**

1. Calibration of Pressure Gauges.
2. Calibration of Transducer for Temperature measurement.
3. Study and Calibration of LVDT Transducer for Displacement Measurement.
4. Calibration of Strain Gauge for the measurement of Strain.
5. Calibration of Thermocouple for Temperature Measurement.
6. Calibration of Capacitive Transducer for Angular Measurement.
7. Calibration of Resistance Temperature Detector for Temperature Measurement.
8. Study and Calibration of a Rotameter for flow measurement.
9. Study and Calibration of Photo and Magnetic Speed Pickups for the measurement of speed

NOTE: All the experiments need to perform.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC62L.1	2	3	1	2	2	-	1	-	2	1	1	2	2
24AMEC62L.2	2	3	1	2	2	-	1	-	2	1	1	2	2
24AMEC62L.3	2	3	1	2	2	-	1	-	2	1	1	2	2
24AMEC62L.4	3	3	-	3	3	-	-	-	-	-	-	2	2
24AMEC62L.5	3	3	-	3	3	-	-	-	-	-	-	2	2

(N. Deepthi)
Metrology Lab Incharge.

K. Ajay kumar Reddy

B. Santosh kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Computer Aided Engineering Lab
Category: PC
Year: III
Semester: II
Course Code: 24AMEC64L
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course objectives:

1. To introduce the basics in modeling software
2. To enable the student to develop and to write the part programs for CNC Machines

Course Outcomes:

At the end of the course, the student will be able to

1. Develop a part model to visualize the components
2. Create NC code and automated tool paths for a given engineering component and machine the components

Part 1: CAD (Computer Aided Design): **03 Weeks**

1. Introduction to CAD Software
2. Development of 3D machine components
3. Assembly of machine components

Part 2: Structural analysis: **05 Weeks**

4. Analysis of a rectangular plate with a hole.
5. Analysis of a truss member under loading.
6. Analysis of a bracket plate with axial loading
7. Analysis of a bracket plate with eccentric loading
8. Static Analysis of Prismatic bar

Part 3: Thermal analysis: (Any two exercises) **02 Weeks**

9. Analysis of a square plate considering conduction.
10. Analysis of a square plate considering conduction and convection.
11. Axisymmetric thermal analysis using ANSYS.
12. Thermal stress and thermal strain analysis using ANSYS

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC64L.1	3	3	3	3	3	-	2	2	2	-	2	2	2
24AMEC64L.2	3	3	3	3	3	-	2	2	2	-	2	2	2
24AMEC64L.3	3	3	3	3	3	-	2	2	2	-	2	2	2
24AMEC64L.4	3	3	3	3	3	-	2	2	2	-	2	2	2
24AMEC64L.5	3	3	3	3	3	-	2	2	2	-	2	2	2

Venkatesh.v – (course co-ordinator)

(P.T.O)

K. Ajay kumar Reddy

B. Santosh kumar

Dr. N. Siva Rami Reddy

Dr. G. Suresh Babu.

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RAJAMPET, Annamayya District, AP – 516126, INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

Annexure – III

Detailed Mapping of Sustainable Development Goals (SDGs), Indian Knowledge System (IKS) and Cross-cutting Issues in the Curriculum

Integration of SDGs, IKS and Cross-Cutting Issues in Curriculum

S. No.	Course Code & Title	Unit-wise Content / Topic	SDG Mapping & Justification	IKS Integration & Justification	Cross-cutting Issues & Justification
1	24AMEC51T – Machining Processes	Metal cutting theory, machining operations, grinding and non-traditional machining	**SDG 9 & SDG 12:** Promotes industrial innovation, precision manufacturing and efficient material utilization.	Traditional machining and indigenous metal craft practices are discussed.	Sustainable manufacturing, industrial safety and resource optimization are addressed.
2	24AMEC52T – I.C. Engines & Gas Turbines	Combustion, engine systems, fuel injection and gas turbines	**SDG 7 & SDG 13:** Focuses on fuel efficiency, emission reduction and sustainable energy utilization.	Traditional bio-fuels and indigenous fuel utilization practices are introduced.	Environmental sustainability, energy conservation and clean energy awareness are emphasized.
3	24AMEC53T – Design of Machine Members	Design of joints, springs, gears, bearings and shafts	**SDG 9:** Encourages optimized mechanical design and efficient material usage.	Ancient Indian engineering concepts related to durability and structural stability are highlighted.	Engineering ethics, safety and reliability in mechanical design are incorporated.
4	24AMEC5AT – Mechanical Vibrations	Free and forced vibrations, damping and balancing	**SDG 9:** Supports reliable machine operation and industrial efficiency.	Traditional balancing concepts used in rotating systems are discussed conceptually.	Industrial safety, maintenance and machine reliability are emphasized.
5	24AMEC5BT – Automation & Robotics	Automation systems, sensors, actuators and robotics	**SDG 9:** Promotes industrial automation and smart manufacturing technologies.	Automation applications in traditional and rural industries are discussed.	Digital transformation, interdisciplinary learning and employability skills are promoted.

6	24AMEC5CT – Renewable Energy Resources	Solar, wind, biomass, tidal and direct energy conversion systems	**SDG 7 & SDG 13:** Encourages clean energy generation and environmental sustainability.	Biomass utilization, solar drying and rural energy practices are discussed.	Renewable energy awareness, sustainability and environmental responsibility are integrated.
7	24AMEC54L – Machining Processes Laboratory	Machining operations and product development exercises	**SDG 9:** Supports skill development in manufacturing processes.	Traditional manufacturing skills and practical machining techniques are introduced.	Hands-on learning, teamwork and industrial skill development are emphasized.
8	24AMEC55L – Refrigeration & Air Conditioning Laboratory	Refrigeration systems, air conditioning experiments and clean air technology	**SDG 7 & SDG 13:** Promotes energy-efficient cooling systems and environmental awareness.	Passive cooling concepts inspired from traditional Indian structures are discussed.	Environmental protection, thermal comfort and energy conservation are addressed.
9	24AMEC55S – MATLAB for Mechanical Engineers	Simulation, modelling and engineering computations	**SDG 4:** Enhances technical education through computational learning.	Computational analysis for solving traditional and modern engineering problems is encouraged.	Digital skills, problem-solving ability and interdisciplinary applications are promoted.
10	24AAUD51T – Gender Sensitization	Gender equality, ethics and societal awareness	**SDG 5:** Promotes gender equality and inclusive social development.	Indian ethical values and societal harmony concepts are introduced.	Gender equity, social responsibility and ethical awareness are emphasized.
11	24AMEC61T – Heat Transfer	Conduction, convection, radiation and heat exchangers	**SDG 7 & SDG 13:** Encourages energy-efficient thermal system design.	Passive cooling and heat management concepts from traditional architecture are discussed.	Energy conservation and sustainable engineering practices are incorporated.
12	24AMEC62T – Metrology & Measurements	Measurement systems, comparators and pressure measurement methods	**SDG 9:** Supports precision engineering and quality assurance practices.	Ancient Indian measurement systems such as Angula and Hasta are introduced.	Quality standards, industrial measurement practices and engineering accuracy are emphasized.
13	24AMEC63T – CAD/CAM	CAD modelling, CNC programming and	**SDG 9:** Promotes digital manufacturing and industrial innovation.	Traditional engineering drawings and design	Digital transformation, automation and modern

		computer integrated manufacturing		concepts are digitally preserved.	manufacturing practices are addressed.
14	24AMEC64L – Computer Aided Engineering Laboratory	Structural and thermal analysis using CAE tools	**SDG 9:** Encourages optimized and reliable engineering design practices.	Structural concepts inspired from ancient Indian engineering structures are discussed.	Simulation-based learning, software skills and engineering problem solving are promoted.
15	24AMEC6AT – Smart Manufacturing	Industry 4.0, IIoT, AI and sustainable manufacturing	**SDG 9 & SDG 12:** Encourages industrial innovation and responsible manufacturing systems.	Lean manufacturing concepts aligned with traditional resource optimization are discussed.	Sustainable manufacturing, digitalization and interdisciplinary learning are promoted.
16	24AMEC6BT – Additive Manufacturing	Rapid prototyping, 3D printing and reverse engineering	**SDG 12:** Encourages material-efficient manufacturing and waste reduction.	Product development inspired by natural and indigenous design concepts is discussed.	Sustainable manufacturing, innovation and emerging technology awareness are integrated.
17	24AMEC6CT – Automobile Engineering	Vehicle systems, steering, suspension and hybrid vehicles	**SDG 7 & SDG 13:** Supports sustainable transportation and emission reduction.	Evolution of transportation systems and alternative fuel practices in India are discussed.	Road safety, environmental awareness and green mobility concepts are emphasized.
18	24AMEC6DT – Design of Transmission Systems	Belt drives, gears, gearboxes and IC engine components	**SDG 9:** Encourages efficient mechanical power transmission system design.	Traditional power transmission concepts and mechanical design practices are introduced.	Machine safety, reliability and optimized design practices are emphasized.
19	24AMEC6ET – Modern Machining Processes	USM, AJM, ECM, EDM and advanced machining methods	**SDG 9 & SDG 12:** Supports precision manufacturing and efficient resource utilization.	Indigenous precision manufacturing concepts and surface finishing practices are discussed.	Advanced manufacturing technologies and industrial modernization are addressed.
20	24AMEC6FT – Operations Research	Linear programming, transportation and inventory models	**SDG 9:** Encourages optimization in industrial and production systems.	Traditional resource management and optimization concepts are connected conceptually.	Decision-making, resource optimization and industrial management skills are promoted.

21	24AMEC6GT – Computational Fluid Dynamics	Numerical analysis, discretization and CFD applications	**SDG 9:** Supports advanced engineering analysis and sustainable design optimization.	Fluid flow concepts inspired from natural systems and ancient structures are discussed.	Computational learning, simulation skills and interdisciplinary applications are promoted.
22	24AMEC6HT – Finite Element Methods	Structural and thermal analysis using FEM	**SDG 9:** Enhances reliable and optimized engineering design.	Structural analysis concepts inspired from ancient Indian architecture are discussed.	Software-based analysis, safety and engineering reliability are emphasized.
23	24AMEC72L – Applied Robotic Control Laboratory	Robot programming and automation experiments	**SDG 9:** Promotes practical automation and robotics applications.	Robotics support for traditional industrial operations is discussed.	Skill development, automation and interdisciplinary learning are integrated.
24	24AMEC73L – Computer Aided Manufacturing Laboratory	CNC programming and manufacturing simulations	**SDG 9:** Encourages digital manufacturing skills and industrial automation.	Traditional manufacturing concepts are integrated with modern production systems.	Hands-on learning, software exposure and employability skills are promoted.
25	24AMEC74L – Product Development Laboratory	Design process, synthesis and prototype development	**SDG 9 & SDG 12:** Encourages innovative and sustainable product development practices.	Product development inspired by indigenous design principles is discussed.	Creativity, teamwork, innovation and entrepreneurship are promoted.
26	24AMEC75I – Evaluation of Industry Internship	Industrial training and practical exposure	**SDG 8 & SDG 9:** Enhances employability and industrial competency.	Exposure to local industrial and indigenous manufacturing practices is encouraged.	Professional ethics, industrial exposure and societal responsibility are emphasized.

HEAD OF THE DEPARTMENT
MECHANICAL ENGINEERING
ANNAMACHARYA UNIVERSITY
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RAJAMPET, Annamayya District, AP – 516126, INDIA

DEPARTMENT OF MECHANICAL ENGINEERING

Annexure – IV

Approved List of Examiners for III Year Courses/Subjects.

Board of Studies (BoS) Meeting in Department of Mechanical Engineering

Date: 02.05.2026
Time: 10:30 AM
Venue: CAD/CAM Lab, Department of Mechanical Engineering

III Year – I & II Semester Subjects Experts List

Subject Title & Code - Machining Processes (24AMEC51T)

Name & Designation	Address	Phone No & E-Mail Address
Dr. V. Satish Kumar Professor	Department of Mechanical Engineering G. Pulla Reddy Engineering College, Kurnool.	817252909398 vutukur@gmail.com
Dr. P. Sivaiah Assoc. Professor	Madanapalle Institute of Technology & Science, Madanapalle.	9848360295 ivaiahp@mits.ac.in
Dr. B Vishnu Vardhan Naidu Assoc. Professor	Department of Mechanical Engineering Mohan Babu University, Tirupati.	9010106707 drbvvnaidu@gmail.com
Dr. Hema Pothur Professor	S V U College of Engineering, S V University, Tirupathi	9490247265 hemasvumech@gmail.com
Dr. S Indumati Professor	NBKR Institute of Science and Technology. Vidyanagar	8985121344 indu_knr@rediffmail.com

Subject Title & Code - I.C. Engines & Gas Turbines (24AMEC52T)

Name & Designation	Address	Phone No & E-Mail Address
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Dr Balaji M Associate Professor	Annamacharya Institute of Technology & Sciences , Tirupati	8977416189 prof.mbalaji@gmail.com
Dr. Balaji Ganesh N Assistant Professor	SV College of engineering, Tirupati	9849094522 balajiganeshn@gmail.com
Dr R Jyothu Naik Assistant Professor	Sandip institute of Technology and Research Centre, Nashik	9948504603 ramavathu.naik@sitrc.org

Subject Title & Code - Design of Machine Members (24AMEC53T)

Name & Designation	Address	Phone No & E-Mail Address
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Dr B.Vinod Associate Professor	Siddharth Institute of Engineering and Technology, Puttur.	7702969673 vinod.c2009@gmail.com
Dr.K.Mallikarjuna Professor	G. Pullaiah College of Engineering and Technology, Kurnool -518002	7660916753 mallikarjuna.gtl@gmail.com
Dr S Altaf Hussain Professor	School of Mechanical Engineering, RGMCET Nandyal	9494738100
Dr. V. Diwakar Reddy Professor	S V University College of Engineering, SV University, Tirupathi.	9440088282 vdrsvuce@gmail.Com

Subject Title & Code - Smart Materials (24AMEC5AT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. Amruthaluru Sai Kiran, Assistant Professor	School of Marine Engineering and Technology, Indian Maritime University, Chennai	8122310903, asaikiran@imu.ac.in
Dr. G. V. Krishna Pradeep Assistant Professor	Department of Mechanical Engineering Aditya University, Surampalem-533437	9493572223 krishnapradeepg@adityauniversity.in
Bharat Kumar Chigilipalli Assistant Professor	Vignan's Institute of Information Technology Visakhapatnam, Andhra Pradesh-530049,	85001 04105 bharat@vignaniit.edu.in
Dr K R Narendra Reddy Professor & Head	Kakatiya Institute of Technology and Science, Warangal.	9396431009 krnr.me@kitsw.ac.in
Dr B Vishnu Vardhan Naidu Associate Professor	School of Engineering, Mohan Babu University, Tirupati	9010106707 drbvvnaidu@gmail.com

Subject Title & Code - Automation & Robotics (24AMEC5BT)

Name & Designation	Address	Phone No & E-Mail Address
Bharat Kumar Chigilipalli Assistant Professor	Vignan's Institute of Information Technology, Visakhapatnam	8500104105 bharat@vignaniit.edu.in
Dr. Potta Sivaiah Associate Professor	Madanapalle Institute of Technology & Science, Madanapalle.	9848360295 sivaiah.337@gmail.com
Dr. V. Chengal Reddy Associate Professor	Annamacharya Institute of Technology & Sciences, Tirupati	8019956112 vcreddyaits@gmail.com
Dr.P.Ravi Kumar Professor	CMR College of Engineering and Technology, Hyderabad, -501401	9293139553, 9248001456 pravikumar@cmrcet.ac.in
Dr G Bala Narasimha Assistant Professor	Madanapalle Institute of Technology & Science, Madanapalle	9515795349 balanarasimha.g@gmail.com

Subject Title & Code - Renewable Energy Resources (24AMEC5CT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. S. Shakeel Ahamed Associate Professor	Department of Mechanical Engineering KSRM College of Engineering, Kadapa.	9441404099 shakeelahamed@ksrmce.ac.in
Dr. C. Vijay bhaskar reddy Professor	Sri Venkateswara College of Engineering and Technology, Chittoor.	7729999156 hodme@svcetedu.org
Dr. K. L Narasimhamu Professor	School of Engineering, Mohan Babu University, Tirupati.	9440941411 klsimha@gmail.com
Dr. C.V Subba Reddy Professor	Department of Mechanical Engineering RSR Engineening College. Kavali	9849737134 : cvs.reddyrsr@gmail.com
Dr. N. Kiran Kumar Associate Professor	VNR Vignana Jyothi Institute of Engineering and Technology, Bachupalli, Hyderabad	9481523799 kirankumarn@vnrvjiet.in

Subject Title & Code - Mechanical Vibrations (24AMEC5DT)

Name & Designation	Address	Phone No & E-Mail Address
Dr.P.Ravi Kumar Professor	CMR College of Engineering and Technology, Hyderabad,-501401	9293139553, 9248001456 pravikumar@cmrcet.ac.in
Dr.M.Vamsee Krishna Professor	SV College of Engineering, Karakambadi Road, Tirupati-517501	8978407734 mamidivk@gmail.com
Dr.K.Mallikarjuna Professor	Ashoka women's engineering College, Kurnool,-518218	7660916753 mallikarjuna.gtl@gmail.com
Dr.B.Sidda Reddy Professor	RGM College of engineering &Technology, Nandyal, -518501	9440844600 bsrrgmcet@gmail.com
Dr.B.Sidda Reddy Associate Professor	Siddartha Educational Academy Group of Institutions,Tirupati-517507	7989112188 sneha@siddarthaedu.in

Subject Title & Code - Heat Transfer (24AMEC61T)

Name & Designation	Address	Phone No & E-Mail Address
Dr. V V N Bhaskar Associate Professor	Aditya college of Engineering, Madanapalle	9885094705 bhaskarvvn@gmail.com
Dr B Satheesh Kumar Associate professor	NBKR Institute of Science and Technology, Vakadu, Nellore region.	9440565424 satheeshkumar76svu@gmail.com, satheeshkumar@nbkrist.org
Dr. H. Suresh Babu Rao Associate professor	Chaitanya Bharathi Institute of Technology, Proddatur.	9010825356 hsbr110479@gmail.com
Dr S Sunil Kumar Reddy Professor	Siddhartha Institute of technology and sciences, puttur	9441108348 s.sunilkumarreddy@sietk.org
Dr. N. Kiran Kumar Associate Professor	VNR Vignana Jyothi Institute of Engineering and Technology, Bachupalli, Hyderabad	9481523799 kirankumarn@vnrvjiet.in

Subject Title & Code - Metrology & Measurements (24AMEC62T)

Name & Designation	Address	Phone No & E-Mail Address
Dr S Altaf Hussain Professor	Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal – 518501.	9494738100 rgmaltaf1@gmail.com
Dr G Bala Narasimha Assistant Professor	Madanapalle Institute of Technology & Science, Madanapalle	9515795349 balanarasimha.g@gmail.com
Dr S Solomonraj Associate Professor	Chaitanya Bharathi Institute of Technology, Hyderabad.	9949655133 solomonraj_mech@cbit.ac.in
Dr K R Narendra Reddy Professor & Head	Kakatiya Institute of Technology and Science, Warangal.	9396431009 krnr.me@kitsw.ac.in
Dr. K. Dharma Reddy Professor	Sri Venkateswara University College of Engineering, Tirupati,	9494697899, 9493105099 kdharmareddy@gmail.com

Subject Title & Code - CAD/CAM (24AMEC63T)

Name & Designation	Address	Phone No & E-Mail Address
Dr D Govardhan Professor	Institute of Aeronautical Engineering, Dubdigal, Hyderabad	9948503909 dussagovardan@gmail.com
Dr Chaithanya Kalangi Associate Professor	MLR Institute of Technology & Management, Hyderabad	9550035671 chaithanyakalangi@gmail.com
Dr B Venkatesh Professor	G Pulla Reddy Engineering College, Nandya Road ,Kurnool	7659964379, 7989164222 goudvenu@gmail.com
Dr B Vishnu Vardhan Naidu Associate Professor	School of Engineering, Mohan Babu University, Tirupati	9010106707 drbvvnaidu@gmail.com
Dr Jaya Kanda Samy Professor	Maturi Venkata Subba Rao Engineering College, Saroor Nagar, Hyderabad	9441346022 kandaswamy_mech@mvsrec. edu.in

Subject Title & Code - Smart Manufacturing (24AMEC6AT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. P. Hema Professor	Sri Venkateswara University College of Engineering, Tirupati,	9490247265 hema_pothur@yahoo.com
Dr. K. Dharma Reddy Professor	Sri Venkateswara University College of Engineering, Tirupati,	9494697899, 9493105099 kdharmareddy@gmail.com
Dr.P.Venkataramaiah Professor	Sri Venkateswara University College of Engineering, Tirupati,	08772289445 pvramaiah@gmail.com
Dr.Ch.R.Vikram Kumar Professor	NBKR Institute of Science and Technology, Vidyanagar.	9490321975 mehod@nbkrist.org
Dr. G. Bala Narasimha Assistant Professor	Madanapalle Institute of Technology & Science, Madanapalle	9515795349 balanarasimha.g@gmail.com

Subject Title & Code - Additive Manufacturing (24AMEC6BT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. A. Damodar Reddy Associate Professor	JNTU College of Engineering, Pulivendula, 516390 YSR Kadapa(Dt)	9492036921 adamodarareddy@gmail.Com
Dr. R. Meenakshi Reddy Associate Professor	G Pullareddy College of Engineering and Technology (Autonomous), Kurnool	9000321874 rmreddy123@gmail.com
Dr. A. Mahamani Professor	Sri Venkateswara college of engineering and Technology (Autonomous), RVS Nagar, Chittoor	8179101287 mahamanisudhan@gmail.com
Dr. N. Kiran Kumar Associate Professor	VNR Vignana Jyothi Institute of Engineering and Technology, Bachupalli, Hyderabad	9481523799 kirankumarn@vnrvjiet.in
Dr S Altaf Hussain Professor	Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal	9494738100 rgmaltaf1@gmail.com

Subject Title & Code - Automobile Engineering (24AMEC6CT)

Name & Designation	Address	Phone No & E-Mail Address
Dr.B.Sudheer Premkumar Professor	JNTUH, Kukatpally, Hyderabad	9849451103 bsudheerpk@yahoo.co.in
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Dr.T.Hariprasad Professor	Mohanbabu University. Rangampet, Tirupathi	7989768820 thprasads@gmail.com
Prof. T.V.Rao Principal	DBS Institute of technology, kavali, nellore	9491924588 tvrao4@rediffmail.com
Dr. R. Meenakshi Reddy Associate Professor	G Pullareddy College of Engineering and Technology (Autonomous), Kurnool	9000321874 rmreddy123@gmail.com

Subject Title & Code - Design of Transmission System (24AMEC6DT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. Y.Venkata Mohan Reddy Professor & Dean Academics	G. Pulla Reddy Engineering College, Kurnool.	633646084422.00 yvmr06@gmail.com
Dr. Ved Prakash Asst. Professor	Madanapalle Institute of Technology & Science, Madanapalle.	8826153120 drvedprakash@mits.ac.in
Dr. P. Chandarakant Assistant professor	NBKR Institute of Science and Technology. Vidyanagar	9493210690 y.sravani.999@gmail.com
Dr. V Chengal Reddy Assistant Professor	Annamacharya Institute of Technology & Sciences, Tirupati	8019956112 vcrreddyaits@gmail.com
Dr.T. Pramod Kumar Assistant Professor	NBKR Institute of Science and Technology. Vidyanagar	9247714280 yudham.pramod@gmail.com

Subject Title & Code - Modern Machining Processes (24AMEC6ET)

Name & Designation	Address	Phone No & E-Mail Address
Dr. POTTA SIVAIAH Associate Professor	Madanapalle Institute of Technology & Science, Madanapalle.	9848360295 sivaiah.337@gmail.com
Dr. P. Venkata Ramaiah PROFESSOR	S V U College of Engineering, S V University, Tirupathi	9291602889 pvramaiah@gmail.com
Dr. V. Chengal Reddy Associate Professor	Annamacharya Institute of Technology & Sciences, Tirupati	8019956112 vcreddyaits@gmail.com
Dr. A. Damodar Reddy Associate Professor	JNTU College of Engineering, Pulivendula, 516390 YSR Kadapa(Dt)	9492036921 adamodarareddy@gmail.Com
Dr.P.Venkataramaiah Professor	Sri Venkateswara University College of Engineering, Tirupati,	08772289445 pvramaiah@gmail.com

Subject Title & Code - Operations Research (24AMEC6FT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. K .Mallikarjuna Professor	G. Pullaiah College of Engineering, Kurnool	7660916753 Kasireddy.kmr@gmail.com
Dr. Rameswar reddy Associate Professor	JNTU College of Engineering, Pulivendula	9666090727 yrameswarareddy.mech@jntua.ac.in
Dr. N Rajesh Associate Professor	S.V.College of Engineering, Tirupati	9985289928 rajesh.n@svcolleges.edu.in
Dr. B. Konda Reddy Professor	PBRVITS, Kavali	9440141605 kondareddy.r@visvodayata.ac.in
Dr. P. Hema Professor	Sri Venkateswara University College of Engineering, Tirupati,	9490247265 hema_pothur@yahoo.com

Subject Title & Code - Computational Fluid Dynamics (24AMEC6GT)

Name & Designation	Address	Phone No & E-Mail Address
Dr.Y.Rameswar Reddy Associate Professor	Department of Mechanical Engineering, JNTU College of Engineering, Pulivendula	7660916753 yrameswarareddy.mech@jntua.ac.in
Dr.B.Sidda Reddy Professor	Department of Mechanical Engineering, RGM College of Engineering, Nandyal	9440844600 bsrrgmcet@gmail.com
Dr.K.Mallikarjuna Professor	Ashoka Women's Engineering College, Kurnool.	7660916753 mallikarjuna.gtl@gmail.com
Dr.N.Rajesh Professor	Department of Mechanical Engineering, SV College of Engineering,Tirupati.	9985289928 rajesh06@gmail.com
Dr.B.Konda Reddy Professor	PBR Visvodaya Institute of Technology and Science, Kavali.	9440141605 ce_vits@visvodayaata.ac.in

Subject Title & Code - Finite Element Methods (24AMEC6HT)

Name & Designation	Address	Phone No & E-Mail Address
Dr. A. Damodar Reddy Associate Professor	JNTU College of Engineering, Pulivendula, 516390 YSR Kadapa(Dt)	9492036921 adamodarareddy@gmail.Com
Dr B.Vinod Associate Professor,	Siddharth Institute of Engineering and Technology, Puttur	7702969673 vinod.c2009@gmail.com
Dr. GV R Seshagiri Rao Professor,	IARE, Institute of Aeronautical Engineering. Hyderabad.	9490074689 gvr.seshagirirao@iare.ac.in
Dr. T. Hari Prasad Professor,	Mohan Babu University, Rangampet, Tirupathi.	9885404470 hariprasad.t@mbu.asia
Dr. K. Thirupathi reddy Professor,	Department of Mechanical Engineering, RGM, Nandyala-518501	9441016367 hme@rgmcet.edu.in

Outlook

Re: Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

From DIWAKAR REDDY.V <vdrsvuce@gmail.com>
Date Sat 09-05-2026 18:06
To Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>

Approved

Dr.V. DEEWAKKARA REDDY,M.Tech(Design),MIE,MTSI,Ph.D
PROFESSOR, SIEMENS (CoE) SVU Co-ordinator.
DEPARTMENT OF MECHANICAL ENGINEERING
COLLEGE OF ENGINEERING
SRI VENKATESWARA UNIVERSITY
TIRUPATI - 517 502
Email: vdrsvuce@gmail.com; diwakarmech.v@svuniversity.edu.in
Phone: 6305488903

On Sat, 9 May 2026, 13:40 Head-Mechanical Engineering, <hodme@annamacharyauniversity.edu.in> wrote:

> Respected Sir,
>
> Greetings from the Department of Mechanical Engineering, Annamacharya University, Rajampet.
>
> With reference to the Board of Studies (BoS) meeting conducted on 02.05.2026 for the finalization of III & IV Year Mechanical Engineering curriculum course structure and detailed syllabi of III Year I & II Semesters Mechanical Engineering courses under AU-24 Regulations, the finalized Minutes of Meeting along with the revised syllabi are enclosed herewith for your kind perusal and approval.
>
> The valuable suggestions and recommendations provided by the esteemed external BoS members during the meeting have been carefully reviewed and suitably incorporated in the respective course syllabi wherever applicable. The revised syllabi have also been verified and signed by the respective course coordinators and internal BoS members.
>
> In this regard, you are kindly requested to go through the enclosed documents and acknowledge the same. The finalized curriculum and syllabi may kindly be approved for implementation under AU-24 Regulations from the forthcoming academic year.
>
> The Department sincerely thanks you for your valuable guidance, support and suggestions towards strengthening the curriculum in line with industry requirements, emerging technologies, Outcome-Based Education (OBE), Sustainable Development Goals (SDGs) and Indian Knowledge System (IKS) concepts.
>
> Enclosures:
>
> 1. Finalized BoS Minutes of Meeting
> 2. Action Taken Report (ATR)

3. III & IV Year Course Structure

4. III Year I & II Semester Course Syllabi

Regards,

Dr. G. Suresh Babu
Head of the Department
Department of Mechanical Engineering
Annamacharya University, Rajampet

Mobile: 9949224453, 9866632446

Outlook

Re: Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

From Dr. B. Durga Prasad <durga.mech@jntua.ac.in>
Date Sat 09-05-2026 20:04
To Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>

Approved from my side.

On Sat, 9 May, 2026, 1:40 pm Head-Mechanical Engineering, <hodme@annamacharyauniversity.edu.in> wrote:

> Respected Sir,
>
> Greetings from the Department of Mechanical Engineering, Annamacharya University, Rajampet.
>
> With reference to the Board of Studies (BoS) meeting conducted on 02.05.2026 for the finalization of III & IV Year Mechanical Engineering curriculum course structure and detailed syllabi of III Year I & II Semesters Mechanical Engineering courses under AU-24 Regulations, the finalized Minutes of Meeting along with the revised syllabi are enclosed herewith for your kind perusal and approval.
>
> The valuable suggestions and recommendations provided by the esteemed external BoS members during the meeting have been carefully reviewed and suitably incorporated in the respective course syllabi wherever applicable. The revised syllabi have also been verified and signed by the respective course coordinators and internal BoS members.
>
> In this regard, you are kindly requested to go through the enclosed documents and acknowledge the same. The finalized curriculum and syllabi may kindly be approved for implementation under AU-24 Regulations from the forthcoming academic year.
>
> The Department sincerely thanks you for your valuable guidance, support and suggestions towards strengthening the curriculum in line with industry requirements, emerging technologies, Outcome-Based Education (OBE), Sustainable Development Goals (SDGs) and Indian Knowledge System (IKS) concepts.
>
> Enclosures:
>
> 1. Finalized BoS Minutes of Meeting
> 2. Action Taken Report (ATR)
> 3. III & IV Year Course Structure
> 4. III Year I & II Semester Course Syllabi
>
> Regards,
>
> Dr. G. Suresh Babu
> Head of the Department
> Department of Mechanical Engineering
> Annamacharya University, Rajampet

Outlook

Re: Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

From Veera S <veera.s@pennarindia.com>
Date Sun 10-05-2026 20:41
To Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>; aits.med.nsrr@gmail.com <aits.med.nsrr@gmail.com>; aits.med.bsk@gmail.com <aits.med.bsk@gmail.com>; Ajay kumar <aits.med.kakr@gmail.com>; DIWAKAR REDDY.V <vdrsvuce@gmail.com>; diwakarreddy@svumail.edu.in <diwakarreddy@svumail.edu.in>; durga.mech@jntua.ac.in <durga.mech@jntua.ac.in>; bsurimisetty@microsoft.com <bsurimisetty@microsoft.com>

Hello Sir

Greetings !

Glad to be part of the BoS meetings held on 02.05.2026.

I acknowledge the receipt of Minutes and confirm to proceed for Implementation.

Looking forward for the continued sustainable strengthening of curriculum

Best Regards,
Veeranjaneyulu S

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From: Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>
Sent: Saturday, May 9, 2026 1:40:16 pm
To: aits.med.nsrr@gmail.com <aits.med.nsrr@gmail.com>; aits.med.bsk@gmail.com <aits.med.bsk@gmail.com>; Ajay kumar <aits.med.kakr@gmail.com>; DIWAKAR REDDY.V <vdrsvuce@gmail.com>; diwakarreddy@svumail.edu.in <diwakarreddy@svumail.edu.in>; durga.mech@jntua.ac.in <durga.mech@jntua.ac.in>; Veera S <veera.s@pennarindia.com>; bsurimisetty@microsoft.com <bsurimisetty@microsoft.com>
Subject: Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

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[Caution: External Mail] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.. When in doubt, contact your IT Department

Respected Sir,

Greetings from the Department of Mechanical Engineering, Annamacharya University, Rajampet.

With reference to the Board of Studies (BoS) meeting conducted on 02.05.2026 for the finalization of III & IV Year Mechanical Engineering curriculum course structure and detailed syllabi of III Year I & II Semesters Mechanical Engineering courses under AU-24 Regulations, the finalized Minutes of Meeting along with the revised syllabi are enclosed herewith for your kind perusal and approval.

Outlook

RE: Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

From Surimisetty Bala Krishna <bsurimisetty@microsoft.com>
Date Sun 10-05-2026 00:48
To Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>; aits.med.nsrr@gmail.com <aits.med.nsrr@gmail.com>; aits.med.bsk@gmail.com <aits.med.bsk@gmail.com>; Ajay kumar <aits.med.kakr@gmail.com>
Cc DIWAKAR REDDY.V <vdrsvuce@gmail.com>; diwakarreddy@svumail.edu.in <diwakarreddy@svumail.edu.in>; durga.mech@jntua.ac.in <durga.mech@jntua.ac.in>; veera.s@pennarindia.com <veera.s@pennarindia.com>

Dear sir,

Good day. Hope you are doing well!

Firstly, I would like to thank you for inviting us and making us part of the meeting.

I acknowledge receipt of the finalized Minutes of the BoS meeting held on 02.05.2026 along with the revised curriculum and syllabi. The documents have been reviewed, and I am pleased to approve them for implementation from the forthcoming academic year under AU-24 Regulations.

Thank you for your efforts in strengthening the curriculum.

Regards,
Bala Krishna
Tech Support Engineer (L3)
Exchange(Online)/Outlook
Working Hours: Tue-Sat, 8:30PM to 5:30AM IST

Microsoft



From: Head-Mechanical Engineering <hodme@annamacharyauniversity.edu.in>
Sent: Saturday, 9 May, 2026 13:40
To: aits.med.nsrr@gmail.com; aits.med.bsk@gmail.com; Ajay kumar <aits.med.kakr@gmail.com>; DIWAKAR REDDY.V <vdrsvuce@gmail.com>; diwakarreddy@svumail.edu.in; durga.mech@jntua.ac.in; veera.s@pennarindia.com; Surimisetty Bala Krishna <bsurimisetty@microsoft.com>
Subject: [EXTERNAL] Submission of Finalized BoS Minutes and III Year Syllabi under AU-24 Regulations for Kind Approval

You don't often get email from hodme@annamacharyauniversity.edu.in. Learn why this is important

Respected Sir,

Greetings from the Department of Mechanical Engineering, Annamacharya University, Rajampet.

With reference to the Board of Studies (BoS) meeting conducted on 02.05.2026 for the finalization of III & IV Year Mechanical Engineering curriculum course structure and detailed syllabi of III Year I & II Semesters Mechanical Engineering courses under AU-24 Regulations, the finalized Minutes of Meeting along with the revised syllabi are enclosed herewith for your kind perusal and approval.

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In this regard, you are kindly requested to go through the enclosed documents and acknowledge the same. The finalized curriculum and syllabi may kindly be approved for implementation under AU-24 Regulations from the forthcoming academic year.

The Department sincerely thanks you for your valuable guidance, support and suggestions towards strengthening the curriculum in line with industry requirements, emerging technologies, Outcome-Based Education (OBE), Sustainable Development Goals (SDGs) and Indian Knowledge System (IKS) concepts.

Enclosures:

1. Finalized BoS Minutes of Meeting
2. Action Taken Report (ATR)
3. III & IV Year Course Structure
4. III Year I & II Semester Course Syllabi

Regards,

Dr. G. Suresh Babu
Head of the Department
Department of Mechanical Engineering
Annamacharya University, Rajampet

Mobile: 9949224453, 9866632446