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

DEPARTMENT OF MECHANICAL ENGINEERING

2nd BOARD OF STUDIES REGULATION:AU R24

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

MEETING MINUTES

of

SECOND BOARD OF STUDIES

ACADEMIC YEAR: 2025-2026

Date & Time: 09/06/2025 & 09:30AM

Venue: Mechanical Engineering Block

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

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

BoS Members:

Sl.No	Name	Role in BoS	Signature with Date
1	Dr. A. Hemantha kumar, Professor& Head Dept. of Mechanical Engineering Annamacharya University Rajampet. Ph: 9440272504 Email: ahkaits@gmail.com	Chairman	9/6/25
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	9/6/2025
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	9/6/2025
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	9/6/25
5	Dr Anil Kumar E Professor IIT Tirupati	Subject Expert – Member	Attended Online
6	Dr V Diwakar Reddy Professor & Head SVU College of Engineering SV University, Tirupati-517501 Ph: 9440088282	Subject Expert – Member	9.6.25
7	Dr B Durga Prasad Professor, JNTUA College of Engineering, JNTUA-Ananthapuramu Ph: 9441074399	University Nominee-Member	Attended Online
8	Mr S Veeranjaneyulu Head, Business Development Pennar Aerospace Division Hyderabad, Ph: 7799597874 Veera.s@pennarindia.com	Industry Representative – Member	9/6/25
9	Mr S Bala Krishna HCL Technologies, System Analyst Bengaluru, Ph: 9573572923 Surimisetty.balak@hcltech.com	Alumni Representative - Member	9/6/25

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

Circular No: BoS/01/2025 Date: 19.05.2025

CIRCULAR

The 2nd Board of Studies meeting is scheduled to be held from **09.06.2025 to 11.06.2025.** All members are requested to attend the meeting without fail.

Agenda for the 2nd Boards of Studies Meeting:

2.1 Confirmation of the Minutes of the 1st Board of Studies Meeting.

2.2 To discuss and finalize the course structure and syllabus for II-B.Tech., II-B.Sc., and II-B.Sc. (Hons.) Agriculture under the AU-24 Regulations.

2.3 To discuss and finalize the course structure and syllabus for II-M.Sc., II-M.A., II-MCA, II-MBA, and II-M.Tech. under the AU-24 Regulations.

2.4 To discuss and finalize the course structure and syllabus for I-B.Sc. in Anaesthesiology Technology and Operation Technology, I-B.Sc. in Medical Laboratory Technology, and Bachelor of Physiotherapy (BPT) under the AU-24 Regulations.

2.5 To review and address any discrepancies observed in the first-year UG and PG courses (i.e., B.Tech., M.Tech., MBA, MCA, B.Sc., M.Sc., and M.A.) under the AU-24 Regulations.

2.6 To discuss and approve the Programme Educational Objectives (PEOs), Programme Specific Outcomes (PSOs), and Course Outcomes (COs) of the respective departments.

2.7 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.

2.8 To discuss and approve the syllabus for the Annamacharya University Research Admission Test (AURAT) – 2025 for the respective departments.

2.9 To approve the list of examiners for second-year courses/subjects.

2.10 To discuss the introduction of new programmes and/or proposals for increase in intake, if applicable.

2.11 Discussion on feedback received regarding the curriculum

2.12 Any other item with the permission of the Chair.

REGISTRAR
REGISTRAR
ANNAMACHARYA UNIVERSITY
RAJAMPET.

Copy to: PA to Vice Chancellor, for information
Copy to: Dean, Academics
Copy to: All the Chairmen, Boards of Studies
Copy to: The Registrar office, for file

ANNEXURES	TITLES
Annexure-I	Action taken report
Annexure-II	Course structure & syllabi
Annexure-III	Vision-Mission-Peo's – Pso's statements
Annexure-IV	SDG's-CCI-IKS
Annexure-V	AURAT Pre-PhD syllabus
Annexure-VI	List of Examiners

Annexure-I

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

MEETING MINUTES

of

FIRST BOARD OF STUDIES

ACADEMIC YEAR: 2024-25

Date & Time: 24/08/2024 & 02:30PM

Venue: Mechanical Engineering Block

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-01/2024-25/MOM-01 Date: 24/08/2024

DEPARTMENT OF MECHANICAL ENGINEERING

1st BoS Minutes of Meeting

The 1st meeting of Board of Studies (BoS) for Department of Mechanical Engineering is held in hybrid mode on 24th August, 2024 in Room No. 102 of Mechanical Engineering Block at 02:30 PM 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/2024/MECH/1.1	Welcome and Introduction
BoS/2024/MECH/1.2	Review and Approval of First-Year B.Tech. Course Structure and Syllabi under AU24 Regulations
BoS/2024/MECH/1.3	Introduction of New Programs (if applicable)
BoS/2024/MECH/1.4	Review and Approval of M.Tech Course Structure and Detailed Syllabi under AU24 Regulations
BoS/2024/MECH/1.5	Discussion on the Inclusion of Industry-Relevant Courses and Emerging Technologies for Upcoming 2nd, 3rd, and 4th Years under AU24 Regulations.
BoS/2024/MECH/1.6	Discussion and Approval of the Annamacharya Univeristy Research Admission Test -2024 (AURAT) syllabus for the Mechanical Engineering
BoS/2024/MECH/1.7	Discussion and Approval of the course work, including Core subjects and Research Methodology, for Research Programs
BoS/2024/MECH/1.8	Approval of the List of Examiners for First-Year Courses/Subjects
BoS/2024/MECH/1.9	Any other item with permission of the Chair

MINUTES OF THE MEETING

Agenda Item No. BoS/2024/MECH/1.1: Welcome and Introduction

Welcome:

Dr A. Hemantha Kumar, Head, Department of Mechanical Engineering has extended warm welcome to all the members.

Introduction:

At the outset, Dr A. Hemantha Kumar, Head, Department of Mechanical Engineering introduced all the members of the Board of Studies and thanked them for accepting the invitation to the 1st BoS meeting.

The Chairman has presented the Vision, Mission, Program Educational Objectives, Program outcomes and Program Specific Outcomes of the B.Tech Mechanical Engineering. After the discussion the members resolved to approve the Vision, Mission, PEOs, POs & PSOs.

Vision of the Department:

"We envision the department as a premier knowledge centre, by uniting teaching, learning, and research to deliver impactful technical education and innovative research for societal benefit".

Mission of the Department:

M1 - To establish a climate of respect and excellence through precise academic standards.

M2 - To implement the curriculum that incorporates modern research, encourages creative thinking, and enhances students' capacity for critical analysis and problem-solving.

M3 - To execute the program that promote ethical values, diversity, and community engagement through curriculum, activities, and support services.

The Vision, Mission, PEOs, POs and PSOs are stated in the Annexure-I.

Resolution:

The BOS members resolved and approved the Vision, Mission, PEOs, POs and PSOs of the Mechanical Engineering.

Agenda Item No. BoS/2024/MECH/1.2: Review and Approval of First-Year B.Tech Course Structure and Syllabi under AU24 Regulations

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

i) Dr B. Durga Prasad and Dr V Diwakar Reddy suggested to change the title of the course "The Joy of Computing using python" as "Basic Computing using Python".

ii) Dr B. Durga Prasad suggested to change the title of Unit-V of Engineering drawing subject from "Isometric projections/Views" to "Isometric Projections/Conversions".

The First-Year course structure and detailed syllabi of Mechanical subjects is shown in Annexure-II.

Resolution:

After the deliberations the members of BoS accepted for change of name of Unit-V as "Isometric Projections/Conversions". The change in the course title offered by CSE " The Joy of Computing using python" is shared with the Computer Science & Engineering department for discussion in their Board of studies. The members unanimously approved the First-Year Course Structure & Syllabi under AU24 regulations.

Agenda Item No. BoS/2024/MECH/1.3: Introduction of New Programs

The Chairman of Board of Studies opened the discussion on introduction of new programs in the department. The deliberations are made on applying for new programmes keeping the available resources in the department.

Resolution:

After the discussions the members encouraged to apply for the new programmes based on the resources available and keeping the thrust areas in the mind for the next academic year.

Agenda Item No. BoS/2024/MECH/1.4: Review and Approval of M.Tech Course Structure and Detailed Syllabi under AU24 Regulations

M. Tech Course Structure and detailed Syllabi has been presented by Dr A Hemantha Kumar for discussion among the members of the Board of Studies of Mechanical Engineering.

Dr B Durga Prasad suggested that the MOOC courses selection must be in relevance to the specialization of the programme of study in which the post graduate students are enrolled and also suggested that the course should be a 12-week course as offered by any platform offering MOOC. The chairman proposed the enrolment of MOOC course by a student is based on the recommendation of the committee constituted by the Head of the Department.

Dr B Durga Prasad also suggested that the Substitute subject for a student failed in the MOOC course must be equivalent to that of the subject already studied.

M.Tech Course Structure and detailed syllabi under AU24 Regulations are provided in Annexure-III.

Resolution:

After the deliberations the members approved the M.Tech Course Structure and detailed syllabi under AU24 Regulations.

Agenda Item No. BoS/2024/MECH/1.5: Discussion on the Inclusion of Industry-Relevant Courses and Emerging Technologies for Upcoming 2nd, 3rd, and 4th Years under AU24 Regulations.

Dr Anil Kumar E suggested to introduce the following industry relevant courses while framing the structure for 2nd, 3rd and 4th year.

- "Electric Vehicles, Hydrogen & Fuel Cells" course under Thermal Division.
- "Rapid Prototyping/Additive Manufacturing/3D-Printing" courses under Manufacturing Division.
- "Design and manufacturing of composite Materials" under Design Division
- "Autonomous Vehicles" as one advanced course.
- A Course on "Applications of IOT and Machine Learning in Manufacturing".

Resolution:

The members suggested to include the above subjects while framing the courses for 2nd, 3rd and 4th year course structure.

Agenda Item No. BoS/2024/MECH/1.6: Discussion and Approval of the Annamacharya Univeristy Research Admission Test -2024 (AURAT) syllabus for the Mechanical Engineering.

Dr A. Hemantha Kumar presented the syllabus of Mechanical Engineering for Research admission test i.e., AURAT-2024.

Resolution:

Members unanimously approved the syllabus of mechanical engineering for Research admission test.

Agenda Item No. BoS/2024/MECH/1.7: Discussion and Approval of the course work, including Core subjects and Research Methodology, for Research Programs.

Dr A. Hemantha Kumar presented the syllabus of Research methodology, Research publications and ethics. The Course work including the core subjects is also presented.

BoS members suggested that the core subjects course work selection is based on the Doctoral committee recommendations and their approval apart from the mandatory courses.

Resolution:

Members approved the syllabus for research methodology, research publications and ethics courses.

Agenda Item No. BoS/2024/MECH/1.8: Approval of the List of Examiners for First-Year Courses/Subjects.

Dr A. Hemantha Kumar presented the list of examiners for First-Year courses. Members suggested for modification in the list of examiners and suggested to follow the guidelines as per the norms of the University.

List of Examiners is provided in the Annexure-IV.

Resolution:

Members approved the List of examiners for First-Year Courses/Subjects.

Agenda Item No. BoS/2024/MECH/1.9: Any other item with permission of the Chair.

-NIL-

BoS Members:

Sl.No	Name	Status	Signature with Date
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	24/8/2024
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	24/8/24
5	Dr Anil Kumar E Professor IIT Tirupati	Subject Expert – Member	Attended Online
6	Dr V Diwakar Reddy Professor & Head SVU College of Engineering SV University, Tirupati-517501 Ph: 9440088282	Subject Expert – Member	Attended Online
7	Dr B Durga Prasad Professor, JNTUA College of Engineering, JNTUA-Ananthapuramu Ph: 9441074399	University Nominee-Member	Attended Online
8	Mr S Veeranjaneyulu Head, Business Development Pennar Aerospace Division Hyderabad, Ph: 7799597874 Veera.s@pennarindia.com	Industry Representative – Member	Attended Online
9	Mr S Bala Krishna HCL Technologies, System Analyst Bengaluru, Ph: 9573572923 Surimisetty.balak@hcltech.com	Alumni Representative - Member	Attended Online

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

Action Taken Report of 1st BOS Meeting held on 28/04/2024

Agenda	Particulars	Action taken
BoS/2024/MECH/1.1	Welcome and Introduction	----------
BoS/2024/MECH/1.2	Review and Approval of First-Year B.Tech. Course Structure and Syllabi under AU24 Regulations	Suggestions of external BOS members were incorporated in the course structure and followed
BoS/2024/MECH/1.3	Introduction of New Programs (if applicable)	----------
BoS/2024/MECH/1.4	Review and Approval of M.Tech Course Structure and Detailed Syllabi under AU24 Regulations	The course structure is approved and the Mooc courses selection by the students must be in relevance to the specialization of the programme of study in which the post graduate students are enrolled and the course should be a 12-week course as offered by any platform offering MOOC. This will be followed when the M.Tech sudents get admitted.
BoS/2024/MECH/1.5	Discussion on the Inclusion of Industry-Relevant Courses and Emerging Technologies for Upcoming 2nd, 3rd, and 4th Years under AU24 Regulations.	Industry relevant courses will be incorporated during 3rd and 4th year.
BoS/2024/MECH/1.6	Discussion and Approval of the Annamacharya Univeristy Research Admission Test -2024 (AURAT) syllabus for the Mechanical Engineering	Syllabus approved and followed
BoS/2024/MECH/1.7	Discussion and Approval of the course work, including Core subjects and Research Methodology, for Research Programs	Syllabus approved and followed

-	Approval of the List of Examiners for First-Year Courses/Subjects	List of examiners ratified and allowed for question paper preparation.
BoS/2024/MECH/1.9	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

Annexure-II

Course structure

&

Syllabi

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
RAJAMPET, Annamayya District, AP-516126, INDIA

Department of Humanities & Sciences

Date: 28-06-2025

To
The Head of the Department
Mechanical Engineering (ME)
Annamacharya University
Rajampet

Dear Sir/Madam,

Subject: Submission of H&S Courses Offered to **ME** Department for 2nd Year (III & IV Semesters) - Reg.

I am writing to bring to your kind attention that the Department of Humanities and Sciences (H&S) will be offering the following courses to the **ME** department in the 2nd year, for both the III and IV semesters. These courses have been discussed and approved in the 2nd Board of Studies (BOS) meeting.

The list of approved courses is as follows:

B.Tech. III Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT31T	Complex Variables & Partial Differential Equations	3	0	0	3
2	MC	24AENS31T	Environmental Science	2	0	0	0

B.Tech. IV Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT41T	Probability & Statistics	3	0	0	3
2	HSM	24AUHV41T	Universal Human Values-II	3	0	0	3

We request you to kindly consider these courses in the curriculum structure of the **ME** department for the academic year 2025-2026.

Thank you for your attention and cooperation. Please feel free to contact me for any further clarifications.

With Regards,

Dr. L. Obulapathi
Head of the Humanities and Science
Annamacharya University
Rajampet

Enclosure:

1. Syllabus copy of Complex Variables & Partial Differential Equations
2. Syllabus copy of Environmental Science
3. Syllabus copy of Probability & Statistics Universal Human Values-II (UHV-II)
4. Syllabus copy of Universal Human Values-II (UHV-II)

Department of Mechanical Engineering

B.Tech.– II Year I Semester

S.No.	Category	Code	Title	L	T	P	Credits
1	BS	24AMAT31T	Complex Variables and Partial Differential Equations	3	0	0	3
2	ESC	24AMEC31T	Basic Thermodynamics	3	0	0	3
3	PCC	24AMEC32T	Manufacturing processes	3	0	0	3
4	PCC	24AMEC33T	Mechanics of Solids	3	0	0	3
5	PCC	24AMEC34T	Material Science and Metallurgy	3	0	0	3
6	PCC	24AMEC31L	Mechanics of Solids & Materials Science lab	0	0	3	1.5
7	PCC	24AMEC32L	Manufacturing processes Lab	0	0	3	1.5
8	SEC	24AMEC35T	Computer-Aided Drafting and Design(with AutoCAD & CATIA)	1	0	2	2
9	MC	24AENS31T	Environmental Science	2	0	0	-
			Total	**18**	**0**	**8**	**20**

Category	Credits
Basic Science Course	3
Engineering Science Courses	3
Professional core Courses	12
Skill Enhancement Course	2
Total Credits	20

B.Tech. II Year II Semester

S.No.	Category	Code	Title	L	T	P	Credits
1	HSMC	24AMEC41T	Industrial Management	3	0	0	3
2	BS	24AMAT41T	Probability & Statistics	3	0	0	3
3	HSM	24UHV41T	Universal Human Values–II	3	0	0	3
4	PCC	24AMEC42T	Fluid Mechanics & Hydraulic Machines	3	0	0	3
5	PCC	24AMEC43T	Theory of Machines	3	0	0	3
6	PCC	24AMEC44T	Thermal Energy Systems	3	0	0	3
7	PCC	24AMEC41L	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
8	PCC	24AMEC42L	Theory of Machines Lab	0	0	3	1.5
9	SEC	24ACSE47L	Python for Data Science	1	0	2	2
			Total	**19**	**0**	**7**	**23**
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation							

Category	**Credits**
Basic Science Courses	3
Professional core Courses	12
Humanities & Management Science Courses	6
Skill Enhancement Course	2
Total Credits	23

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Complex Variables and Partial Differential Equations
Category:	BS
Couse Code:	24AMAT31T
Branch/es:	ME
Year	II
Semester:	I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives: The course aims to develop a strong understanding of complex variable theory and its techniques, alongside the formulation and solution of partial differential equations, enabling students to model and solve engineering problems in areas such as fluid dynamics, heat transfer, and electromagnetic fields.

Course Outcomes:

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

1. apply the method to construct specific analytic functions from given data or conditions.
2. Apply complex integration methods and analyze power series to solve problems in complex analysis.
3. Apply residue theorem and Rouche's theorem to evaluate complex integrals and determine zeros of complex functions.
4. Solve complex function transformations involving translations, rotations, inversions, and standard functions.
5. Solve one-dimensional wave and heat equations to model and interpret physical phenomena.

Unit 1 Complex Variable – Differentiation **10**

Introduction to functions of complex variable-Definitions of Limit & continuity- Differentiation, Cauchy-Riemann equations (in Cartesian and polar form without proof), analytic functions, harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

Unit 2 Complex Variable – Integration **10**

Line integral-Contour integration, Cauchy's integral theorem (Simple Case), Cauchy Integral formula, generalized Cauchy Integral's formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series (without proof).

Unit 3 Residues **8**

Residues: Singular point – Isolated singular point – Pole of order m – Essential singularity. Residue – Evaluation of residues – Residue theorem. Evaluation of the integral of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$

Determination of Zeros: Rouche's theorem(without proof).

Unit 4 Conformal mapping **8**

Definition – Translation, rotation, and inversion –Transformation by $e^z, lnz, z^2, z^n, sinz$ and $cosz$.

Bilinear transformation -Fixed points– Cross ratio – Determination of bilinear transformation mapping for three given points.

Unit 5 **Applications of Partial Differential Equations** 8

Method of separation of variables- second order partial differential equations- solutions of 1D-wave-1D-heat and 2D-Laplace equations in Cartesian coordinates.

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

CO-PO Mapping:

CO	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AMAT31T.1	3	2	1	2	-	-	-	-	-	-	1
24AMAT31T.2	3	2	1	2	-	-	-	-	-	-	1
24AMAT31T.3	3	2	1	2	-	-	-	-	-	-	1
24AMAT31T.4	3	3	1	2	-	-	-	-	-	-	1
24AMAT31T.5	3	2	1	2	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course: Basic Thermodynamics
Category: ESC
Semester: III Semester
Couse Code: 24AMEC31T
Branch/es: Mechanical

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Impart the awareness on laws of thermodynamics.
2. Enable the students to understand second law of thermodynamics and its applications to various systems.
3. Familiarize steam properties to understand working of steam power plants.
4. Acquire knowledge on equations of state and properties of gas mixtures.
5. Understand the inter-relationship between various air standard cycles used in gas power cycles.

Course Outcomes:

1. Apply the first law of thermodynamics for various energy systems
2. Analyze the performance of thermal engineering devices by using Second law of Thermodynamics.
3. Solve the properties of pure substances by using steam tables.
4. Calculate the P-V-T properties of gases and mixtures.
5. Analyze the Air standard cycles by using the thermodynamic principles

Unit 1 Basic Concepts & First Law Of Thermodynamics 12

System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility, Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition - Types, Work and Heat, Point and Path function.

Zeroth Law of Thermodynamics –Ideal Gas Scale – PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.

Unit 2 Second Law Of Thermodynamics 12

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialities, Thermodynamic scale of Temperature.

Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility Elementary Treatment of the Third Law of Thermodynamics.

Unit 3 Properties of Pure Substances 8

Pure Substances-, P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation, Constructional use of Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

Thermodynamic relations: -Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations.

Unit 4 Perfect Gas Laws & Mixture Of Perfect Gases 13

Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas constant and Molecular Internal Energy, Enthalpy, specific heats and Entropy of Mixture of perfect Gases and Vapour.

Unit 5 Air Standard Cycles 6

Otto, Diesel and Dual cycles, P-V and T -S diagrams - Description and Efficiencies- Mean effective pressures. Comparison of Otto, Diesel and Dual cycles.

Prescribed Textbooks:

1. Engineering Thermodynamics. PK Nag, TMH, 6th edition,2017.
2. Thermodynamics – An Engineering Approach. Yunus Cengel& Boles, TMH. Mcgraw Higher Educaion 9th edition, 2019.

Reference Books:

1. Fundamentals of Thermodynamics. Sonntag, Borgnakke and Van wylen, John Wiley & sons (ASIA) Pt Ltd. Publisher: Wiley; 8 edition (December 26, 2012)
2. Thermodynamics. Mc Graw Hill J. P. Holman, McGraw-Hill College; 4th edition (January 1, 1988)
3. An introduction to Thermodynamics. YVC Rao, Universities Press, 3rd edition 2004
4. Engineering Thermodynamics, Jones & Dugan, PHI INDIA (2011)
5. Basic Engineering Thermodynamics. A. Venkatesh, Universities Press; First edition (2007).

Web resources:

1. https://www.youtube.com/watch?v=9GMBpZZtjXM&list=PLD8E646BAB3366BC8
2. **https://www.youtube.com/watch?v=pMmHdWvN_FI&list=PLyqSpQzTE6M_QOKxVxZ5nQ48gOkzg7zWP&index=1**
3. **https://www.youtube.com/watch?v=2LPQX4F-GoA&list=PLwdnzlV3ogoWV-_n1YItO933MxgPXfEiM**
4. **https://www.youtube.com/watch?v=ZXHbqJj5mk4&list=PLjA7ulhseb0-tML7elONaelFTts6xoG5B**

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	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO_1	PSO_2
24AMEC31T.1	3	2	1	1	-	-	-	-	1	-	1	2	1
24AMEC31T.2	3	3	1	1	-	-	-	-	1	-	1	2	1
24AMEC31T.3	3	2	1	1	-	-	-	-	1	-	1	2	1
24AMEC31T.4	3	2	1	1	-	-	-	-	1	-	1	2	1
24AMEC31T.5	3	3	1	1	-	-	-	-	1	-	1	2	1

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course: MANUFACTURING PROCESSES
Category: PC
Semester: IV Semester
Couse Code: 24AMEC32T
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To know the working principle of different metal casting processes and gating system.
2. To classify the welding processes, working of different types of welding processes and welding defects.
3. To know the nature of plastic deformation, cold and hot working process, working of a rolling mill and types, extrusion processes.
4. To understand the principles of forging, tools and dies, working of forging processes.
5. To know about the Additive manufacturing and processing of plastics.

Course Outcomes:

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

1. Explain casting processes, including pattern making, molding, solidification, and evaluate casting defects with appropriate remedies.
2. Analyze welding processes, joint characteristics, defects, their causes, and evaluate suitable remedies.
3. Analyze bulk forming processes, including metal behavior, and evaluate the effects of forging, rolling, and extrusion techniques.
4. Analyze sheet metal forming techniques, including deep drawing, bending, and evaluate defects and remedies in these processes
5. Explain additive manufacturing and plastic processing techniques, evaluate their advantages, limitations, and applications.

Unit 1 **08**

Casting: Steps involved in making a casting – Advantage of casting and its applications. Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Molding, different types of cores, Principles of Gating, Risers, casting design considerations. Solidification of castings and casting defects- causes and remedies. Basic principles and applications of special casting processes - Centrifugal casting, Die casting, Investment casting and shell molding.

Unit 2 **08**

Welding: Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting.

Basic principles of Arc welding, power characteristics, Manual metal arc welding, submerged arc welding, TIG& MIG welding. Electro–slag welding. Resistance welding, Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma Arc welding, Laser welding, electron beam welding, Soldering &Brazing. Heat affected zones in welding; pre & post heating, welding defects –causes and remedies.

Unit 3 **07**

Bulk Forming: Plastic deformation in metals and alloys-recovery, recrystallization and grain growth. Hot working and Cold working - Strain hardening and Annealing. Bulk forming processes: Forging-Types of Forging, forging defects and remedies; Rolling – fundamentals, types of rolling mills and products, Forces in

rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

Unit 4 **06**

Sheet metal forming-Blanking and piercing, Forces and power requirement in these operations, Deep drawing, stretch forming, Bending, spring back and its remedies, Coining, Spinning. High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

Unit 5 **08**

Additive manufacturing - Steps in Additive Manufacturing (AM), Classification of AM processes, Advantages of AM, and types of materials for AM, VAT photo polymerization AM Processes, Extrusion - Based AM Processes, Powder Bed Fusion AM Processes, Direct Energy Deposition AM Processes, Post Processing of AM Parts, Applications.

Plastics: Classification – Properties – Plastics as engineering materials – Method of processing plastics – Injection moulding –Blow moulding -extrusion compression and transfer moulding

Prescribed Textbooks:

1. S. Kalpakjian and S.R. Schmid, Manufacturing Engineering and Technology, Pearson Education, 2007, 7th Edition. ISBN-13- 978-9332587908
2. P.N. Rao, Manufacturing Technology: Volumes I, 5/e, McGraw Hill Education, 2018, ISBN-13-978-9353160500

Reference Books:

1. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Wiley
2. Amitabha Ghosh and Asok Kumar Mallik, Manufacturing Science, Affiliated East-West Press
3. R.K. Rajput, Manufacturing Technology, Laxmi Publications
4. P.C. Sharma, A Textbook of Production Engineering, S. Chand & Company

Web Resources:

1. https://archive.nptel.ac.in/courses/112/107/112107219/
2. https://archive.nptel.ac.in/courses/112/107/112107145/
3. https://www.youtube.com/playlist?list=PLpW2AOg7zoagirDiiUac0ISIEP734DwNj
4. https://www.youtube.com/watch?v=gvynYCsGh14
5. https://www.youtube.com/watch?v=iy-AuAC_hOg
6. https://nptel.ac.in/courses/112107219

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	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC32T.1	2	2	1	1	-	-	1	-	-	-	-	1	1
24AMEC32T.2	1	3	2	1	-	-	1	-	-	-	-	2	1
24AMEC32T.3	1	3	2	1	-	-	1	-	-	-	-	1	2
24AMEC32T.4	1	3	2	1	-	-	1	-	-	-	-	2	1
24AMEC32T.5	3	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: Mechanics of Solids
Category : PC
Semester: III
Course Code: 24AMEC33T
Branch/es: ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the nature of stresses induced in material under different loads.
2. To plot the variation of shear force and bending moments over the beams under different types of loads.
3. To understand the behavior of beams subjected to bending and shear loads.
4. To calculate the deflection of beams under complex loading.
5. To analyze the thin and thick cylinders under circumferential and radial loading conditions.

Course Outcomes: **Blooms Level of Learning**

A student will be able to

1. Solve for simple stresses and strains when members are subjected to load L3
2. Analyze Shear Force and Bending Moment in the beam subjected to different loading conditions .L4
3. Evaluate shear stresses and bending stresses in a beam subjected to different loading conditions .L5
4. Analyze the deflections in beam subjected to different loading conditions. L4
5. Analyze thin cylindrical and spherical shell. L4

Unit 1 Simple Stresses & Strains **9**

Elasticity– Types of stresses & strains–Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship – Bars of varying section–composite bars (simple problems)–Thermal stresses (simple problems).Strain energy–Resilience, principal stresses and strains - Mohr's circle (Elementary treatment only) .

Unit 2 Shear Force and Bending Moment **8**

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, uniformly varying loads and combination – Point of contra flexure –Relation between S.F.,B.M and rate of loading at a section of a beam.

Unit 3 Bending Stresses & Shear Stresses **8**

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis–Determination of bending stresses–section modulus of rectangular and circular sections (Solid and Hollow),I,T, Angle and Channel sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I,T and angle sections.

Unit 4 Deflection of Beams 9

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam –Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, uniformly varying load.

Unit 5 Thin Cylinders & Thick Cylinders 7

Thin Cylinders: Thin seam less cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.
Thick Cylinders: lame's equation – cylinders subjected to inside & outside pressures.

Prescribed Text Books:

1. Strength of materials by S S Bhavikatti
2. Strength of Materials by S. Ramamrutham

Reference Books:

1. Strength of materials by R S Khurmi& N. Khurmi, S. Chand Publishing
2. S.B. Junnarkar, Mechanics of Structures Vol-III, Charotar publishing house.
3. S.Timoshenko, Strength of Materials, D Van Nostrand Company.
4. Strength of Materials by Dr. Sadhu Singh, ISBN: 978-81-7409-048-5,11th edition..
5. Strength of Materials by SS Rattan, Tata McGraw Hill Education Private Limited; 2nd edition (July 11, 2011)

Web Resources:

1. https://youtu.be/KMiz5UBCplk?si=iipl2kfLhiTP3HlY
2. https://youtu.be/Fui9Lxj3aJc?si=EmXJ9GRpD8oZaoek
3. https://youtu.be/SZM0kGBote4?si=j1yNQZk4TfxVBUKF
4. https://youtu.be/4TJ9DHueyxU?si=yK1neE_L6UvDBdcB
5.. https://youtu.be/MvBqCeZllpQ?si=QexhXifAQ01Xb447
6. https://youtu.be/BUVqrefgHWk?si=REJDjtsAgbgmOF3D ,
7. https://youtu.be/UEmgT1JhMYs?si=S2rOGi1mwfeU3lbp

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering Tool	The Engineer and The World	Ethics	Individual and	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC33T.1	3	3	2	3	-	-	-	1	-	1	-	3	2
24AMEC33T.2	3	3	3	3	-	-	-	-	-	-	-	3	2
24AMEC33T.3	3	3	3	3	-	-	-	-	-	1	-	3	2
24AMEC33T 4	3	3	3	3	-	-	-	1	-	1	-	3	-
24AMEC33T.5	3	3	3	3	-	-	-	1	-	-	-	3	2

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

Title of the Course: Material Science and Metallurgy
Category: PC
Semester: III Semester
Couse Code: 24AMEC34T
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the mechanism of crystallization, imperfections in crystals & factors affecting solid solubility.
2. To study the stability of phases in different alloy systems.
3. To acquire knowledge on properties and structure of ferrous and nonferrous alloys and to select suitable materials for various engineering applications.
4. To learn various methods of heat treatment and surface hardening.
5. To gain knowledge on properties and applications of ceramic, composites & other advanced materials.

Course Outcomes:

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

1. Summarize the crystallization of metals and factors affecting the solid solubility.
2. Analyze the phase diagrams of binary systems and iron-carbide diagram to identify the material composition depending on the design requirements.
3. Summarize the structure, properties and applications of various cast irons, steels and non-ferrous alloys.
4. Apply the various heat treatment processes, surface hardening methods depending on material requirements and summarize the steel making processes.
5. Summarize the concepts of powder metallurgy and properties, applications of ceramic, composites.

Unit 1 **06**

Structure of Metals and Constitution of alloys: Crystallization of metals, Packing Factor - SC, BCC, FCC & HCP. Grain and grain boundaries, effect of grain boundaries – determination of grain size. Imperfections, Slip and Twinning. Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases, and electron compounds.

Unit 2 **08**

Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagrams such as Cu-Ni and Fe-Fe3C.

Unit 3 **07**

Ferrous metals and alloys: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast iron. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys, Magnesium and its alloys, Super alloys. Introduction on Shape memory alloys .

Unit 4 **07**

Heat treatment of Steels: Effect of alloying elements on Fe-Fe3C system, annealing, normalizing, hardening, TTT diagrams, tempering, hardenability, surface - hardening methods, age hardening treatment, Cryogenic treatment.

Metallurgy: Steel Making - Introduction, Methods of steelmaking – crucible process, Bessemer converter process, Open Hearth Process

Unit 5 **08**

Powder Metallurgy: Basic processes- Methods of producing metal powders- milling atomization-Granulation-Reduction-Electrolytic Deposition. Compacting methods – Sintering - Methods of manufacturing sintered parts. Secondary operations, Applications of powder metallurgical products.

Ceramics and Composite materials: Crystalline ceramics, glasses, cermets, abrasive materials, Classification of composites, manufacturing methods, particle reinforced composites, fiber reinforced composites, PMC, MMC, CMC and CCCs.

Prescribed Textbooks:

1. Dr. V. D. kodgire, Material Science and Metallurgy for Engineers, 39/e, Everest Publishing House, 2024, ISBN-13: 978-8176314008
2. O.P. Khanna, A Textbook Of Material Science And Metallurgy, Dhanpat Rai Publications, 2010, ISBN-13- 978-8189928315

Reference Books:

1. S. H. Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.
2. William D. Callister Jr, Materials Science Engineering: An Introduction, 8/e, John Wiley and Sons, 2009.
3. Donald R. Askeland, Essentials of Materials science Engineering, 4/e, CL Engineering publications, 2018.
4. George E. Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.
5. Yip-Wah Chung, Introduction to Material Science and Engineering, 2/e, CRC Press, 2022.

Web Resources:

1. https://archive.nptel.ac.in/courses/113/102/113102080/
2. https://www.youtube.com/watch?v=5vaYfd0fekI
3. https://www.youtube.com/watch?v=zwnblxXyERE
4. https://www.youtube.com/watch?v=ET5igG-Gm30
5. https://archive.nptel.ac.in/courses/113/106/113106098/

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
24AMEC34T.1	2	1	1	1	-	-	-	-	-	-	-	1	2
24AMEC34T.2	1	3	1	1	-	-	-	-	-	-	-	2	1
24AMEC34T.3	2	1	1	1	-	-	-	-	-	-	-	1	2
24AMEC34T.4	3	2	1	1	-	-	-	-	-	-	-	2	1
24AMEC34T.5	2	1	1	1	-	-	-	-	-	-	-	1	2

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Mechanics of Solids and Materials Science Lab
Category:	PC
Semester:	III Semester
Couse Code:	24AMEC31L
Branch/es:	Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To evaluate the values of yield stress, ultimate stress and bending stress of the given specimen under tension test and bending test.
2. To conduct the torsion test to determine the modulus of rigidity of given specimen.
3. To Justify the Rockwell hardness test over with Brinell hardness and measure the hardness of the given specimen.
4. To examine the stiffness of the open coil and closed coil spring and grade them.
5. To analyze the microstructure and characteristics of ferrous and nonferrous alloy specimens.
6. To calculate the hardenability by jominy & quench apparatus.

Course Outcomes:

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

1. Understand the stress strain behavior of different materials.
2. Evaluate the hardness of different materials.
3. Explain the relation between elastic constants and hardness of materials.
4. Identify various microstructures of steels and cast Irons.
5. Evaluate hardness of treated and untreated steels.

List of Experiments:

A) MECHANICS OF SOLIDS LAB

1. Direct tension test
2. Torsion test
3. Hardness test a) Brinell hardness test b) Rockwell hardness test
4. Test on springs
5. Compression test on wood
6. Impact test a) Charpy test b) Izod test
7. Shear test
8. Wear Test
9. Vickers Hardness Test
10. Deflection of beams
11. Liquid penetration test

NOTE: Need to perform any 8 Experiments

B) MATERIAL SCIENCE LAB

1. Study of Microstructures of Pure Metals – Copper & Aluminium.
2. Study of Microstructures of Non – Ferrous Alloy – Brass.
3. Study of Microstructures of Other Alloys – Stainless Steel, Case Carburized Steel & Bearing Metal.
4. Study of Microstructures of Cast Irons – Gray, Malleable & White Cast Irons.

5. Study of Microstructures of Low Carbon Steel & Medium Carbon Steel.
6. Study of Microstructures of Heat-Treated Steels.
7. Finding out the Hardness of Treated and Untreated Steels.
8. Finding out the Hardability of Steels by using Jominy End Quench Test Apparatus.

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
24AMEC31L.1	3	-	-	3	-	-	-	-	-	-	-	1	2
24AMEC31L.2	3	-	-	3	-	-	-	-	-	-	-	1	2
24AMEC31L.3	3	-	-	3	-	-	-	-	-	-	-	1	2
24AMEC31L.4	3	3	-	3	-	-	-	3	-	3	3	2	2
24AMEC31L.5	3	3	-	3	-	-	-	3	-	3	3	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: Manufacturing Processes Lab
Category: PCC
Semester: III Semester
Couse Code: 24AMEC32L
Branch/es: MECHANICAL ENGINEERING

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To acquire practical knowledge on making of patterns and calculation of its allowances, preparation ofmould cavity and casting
2. To impart hands on practical exposure of joining of metals by welding process and its heat affected zone on weldments.
3. To acquire practical knowledge of joining thin metals by spot welding, joining of metals by TIG welding and Gas welding processes.
4. To acquire practical knowledge of making hallow parts like bottles by the blow moulding machine and making of plastic components by the injection moulding machine.

Course Outcomes:

A student will be able to

1. Make Pattern with pattern material selection and pattern allowances.
2. Find sand properties and apply in sand preparation for casting process.
3. Fabricate components using primary manufacturing processes such as casting,welding, joining and forming.
4. Acquire knowledge about the various tools, equipment, machinery and operations required for mechanical press working manufacturing processes.
5. Make the components by processing of plastics using injection and blow moulding

List of Experiments

Casting:

1. Pattern Design and making
2. Sand properties testing - Exercise -for strengths, and permeability – 2 Experiments.
3. (i) Casting preparation.
   (ii).Identification of casting defects.

Welding:

1. ARC Welding Lap & Butt Joint - 2 Experiments.
2. Spot Welding - 1 Experiment.
3. TIG Welding - 1 Experiment.
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device).

Mechanical Press Working:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending and other operations.

Processing Of Plastics

1. Injection Moulding.
2. Blow Moulding.

Note: Minimum of 10 Experiments need to be performed

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	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC32L.1	3	3	3	3	-	-	-	3	1	-	1	2	2
24AMEC32L.2	3	2	1	3	2	-	-	3	1	-	1	1	1
24AMEC32L.3	3	2	1	1	2	-	-	3	-	-	1	2	2
24AMEC32L.4	3	2	1	1	2	-	-	3	-	-	1	2	2
24AMEC32L,5	3	2	1	1	2	-	-	3	-	-	1	2	2

17/6/25

(C. Thiyagarajan)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course: Computer-Aided Drafting and Design (with AutoCAD & CATIA)
Category: SC
Semester: III Semester
Couse Code: 24AMEC35T
Branch/es: Mechanical Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. To familiarize students with basic and advanced 2D drafting techniques using AutoCAD.
2. To enable students to create mechanical joints and machine components using standard conventions.
3. To introduce 3D modeling, part design, and assembly creation using CATIA software.

Course Outcomes:

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

1. Develop detailed technical drawings in AutoCAD, including proper dimensions, labels, and conventions for mechanical parts.
2. Utilize AutoCAD tools to draw and modify mechanical diagrams, applying commands such as Array, Ellipse, and Direct Distance Entry.
3. Create 2D mechanical drawings in AutoCAD, including basic shapes and common mechanical joints like bolts, rivets, and welds.
4. Create 3D parts in CATIA, such as machine components like a Screw Jack, Stuffing Box, Knuckle Joints or Steam Engine Crossheads.
5. Assemble the mechanical systems in CATIA by applying constraints and simulating the interactions of components, such as Screw Jack, Stuffing Box, Knuckle Joints or Steam Engine Crossheads.

Course Content:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations.

Part A: Drafting of Engineering and Machine Drawing Components using AutoCAD

List of Exercises:

(Note: Any six out of the eight exercises listed below can be performed.)

1. Drawing basic 2D shapes: Square, Pentagon, Circle, and n-sided Polygon.
2. Creating line diagrams using:
   - Absolute Coordinate Method
   - Relative Polar Coordinate Method
3. Drawing using advanced tools: Donut, Ellipse, Rectangular and Polar Array.
4. Conversion of isometric to orthographic views using Direct Distance Entry.
5. Detachable joints: Drawing hexagonal and square-headed bolts and nuts, bolted joint with washer and locknut.
6. Riveted joints: Drawing rivets, lap joints, butt joints with single/double straps, single/double riveting.
7. Welded joints: Drawing T-joint, lap joint, and butt joint with standard conventions.
8. Keys: Drawing saddle key, feather key, and round key.

Course Content:

Introduction to CATIA interface, sketching tools, and basic constraints. 3D part modeling using Pad, Pocket, Shaft, Hole, Fillet, and Chamfer. Assembly creation with constraints to build mechanical assemblies. 2D drafting from 3D models with dimensions and annotations.

Part B: Drafting and Visualization of 3D Mechanical Components and Assemblies using CATIA

List of Exercises:

(Note: Any three out of the four assembly exercises listed below can be performed.)

1. Hands-on practice in CATIA interface and Sketcher module – Practicing basic 2D profiles and shapes to build familiarity with the modeling environment (minimum of 6 sketches).
2. Creation of 3D part models of mechanical components (e.g., bolt, nut, shaft, flange, cotter, etc.) using CATIA part design features such as Pad, Pocket, Shaft, and Groove.
3. Knuckle Joint Assembly – Modeling and assembling the individual parts of a Knuckle Joint with proper constraints and ensuring functional movement.
4. Screw Jack Assembly – Creating and assembling the parts of a Screw Jack, ensuring the assembly works with functional motion.
5. Stuffing Box Assembly – Modeling and assembling the Stuffing Box components for sealing and mechanical interaction.
6. Steam Engine Crosshead Assembly – Assembling the individual parts of a Steam Engine Crosshead, including components like the crosshead, piston, and connecting rods.

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
CO 1	3	2	2	-	3	-	-	-	1	1	2	3	2
CO 2	2	2	2	-	3	-	-	-	1	1	2	3	2
CO 3	2	2	2	-	3	-	-	-	1	1	2	3	2
CO 4	3	2	3	2	3	-	-	-	2	2	2	3	3
CO 5	3	3	3	3	3	-	-	-	2	2	3	3	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
RAJAMPET, Annamayya District, AP-516126, INDIA

Department of Humanities & Sciences

Date: 28-06-2025

To
The Head of the Department
Mechanical Engineering (ME)
Annamacharya University
Rajampet

Dear Sir/Madam,

Subject: Submission of H&S Courses Offered to ME Department for 2nd Year (III & IV Semesters) - Reg.

I am writing to bring to your kind attention that the Department of Humanities and Sciences (H&S) will be offering the following courses to the ME department in the 2nd year, for both the III and IV semesters. These courses have been discussed and approved in the 2nd Board of Studies (BOS) meeting.

The list of approved courses is as follows:

B.Tech. III Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT31T	Complex Variables & Partial Differential Equations	3	0	0	3
2	MC	24AENS31T	Environmental Science	2	0	0	0

B.Tech. IV Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT41T	Probability & Statistics	3	0	0	3
2	HSM	24AUHV41T	Universal Human Values-II	3	0	0	3

We request you to kindly consider these courses in the curriculum structure of the ME department for the academic year 2025-2026.

Thank you for your attention and cooperation. Please feel free to contact me for any further clarifications.

With Regards,

Dr. L. Obulapathi
Head of the Humanities and Science
Annamacharya University
Rajampet

Enclosure:

1. Syllabus copy of Complex Variables & Partial Differential Equations
2. Syllabus copy of Environmental Science
3. Syllabus copy of Probability & Statistics Universal Human Values-II (UHV-II)
4. Syllabus copy of Universal Human Values-II (UHV-II)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Environmental Science
Category:	BS
Course Code:	24AENS31T/41T
Branches:	CSE, CSE(AIML), CSE(IOT), EEE, ME / CSE(AI), AIML, CSE(DS), AIDS, CE & ECE
Semester:	III Semester/IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	-	-	-

Course Objectives: This course aims to raise environmental awareness, promote sustainable practices aligned with the Sustainable Development Goals (SDGs), and highlight the significance of ecosystems and biodiversity. It sensitizes students to major pollution issues and related legislative measures, fosters ethical responsibility and problem-solving skills to tackle environmental challenges, and explains the impact of human population growth on the environment and public health. The course also emphasizes the role of education, information technology, and public policy in promoting environmental sustainability.

Course Outcomes:

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

1. explain how natural resources should be utilised with a focus on sustainability.
2. describe the need to protect ecosystems and biodiversity for future generations.
3. comprehend major pollution problems related to ecosystems.
4. Summarize key environmental issues, sustainable practices, and laws supporting environmental protection in the context of sustainable development goals.
5. explain the effects of population growth on environment and health, and the role of education, IT, and welfare programs in managing them.

Unit 1 Natural resources 7

Natural Resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation – Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources– Energy resources: Renewable and non-renewable energy sources (overview only).

Unit 2 Ecosystems, Biodiversity and its conservation 6

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and functions of the following ecosystems: Forest ecosystem and lake ecosystem.

Biodiversity and its conservation: Definition – Values of biodiversity – Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Unit 3 Environmental pollution 5

Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Self-learning: Genetically modified crops

Unit 4 Social issues and the Environment 6

Sustainable development – Rainwater harvesting – Environmental ethics – Climate change, global warming, acid rain, ozone layer depletion – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Environment Protection Act.

Unit 5 Human population and the Environment 6

Population explosion – Family welfare programmes – Environment and human health – Value education – Role of information technology in environment and human health, Field work – Visit to a local area to document environmental assets.

Prescribed Textbooks:

1. Kaushik, Anubha, and C. P. Kaushik. *Perspectives in Environmental Studies*. 6th ed., New Age International Publishers, New Delhi, 2018.
2. Chawla, Shashi. *A Textbook of Environmental Studies*. 1st ed., McGraw Hill Education, New Delhi, 2017.

Reference Books:

1. Joseph, Benny. *Environmental Studies*. 3rd ed., McGraw Hill Education (India), New Delhi, 2017.
2. Dhinakaran, A., and B. Sankaran. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, Mumbai, 2017.
3. Basu, Mahua, and S. Xavier. *Fundamentals of Environmental Studies*. 1st ed., Cambridge University Press, New Delhi, 2017.
4. Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*. 2nd ed., Universities Press (India) Pvt. Ltd., New Delhi, 2013.
5. Tiwari, Vijay Kumar. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, Mumbai, 2017.

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 teamwork	Communication	Project management and finance	Life-long learning
24AENS31T/41T.1	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.2	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.3	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.4	3	2	-	-	-	-	2	-	-	-	3
24AENS31T/41T.5	2	2	-	-	-	-	2	-	-	-	2

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Industrial Management
Category:	HSMC
Couse Code:	24AHS4BT
Branch/es:	ME
Semester:	IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	-	-	2

Course Objectives: The objectives of the course are to

- Introduce the scope and role of industrial engineering and the techniques for optimal design of layouts
- Illustrate how work study is used to improve productivity and project management techniques
- Explain TQM and quality control techniques
- Introduce financial and marketing management aspects and
- Discuss human resource management and value analysis

Course Outcomes:

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

1. Describe the principles and functions of management & Plant layouts.
2. Apply work study methods and project management concepts at Industrial level.
3. Analyze data using control charts to monitor, improve quality and inventory control.
4. Describe various sources of finance, marketing and their implications.
5. Describe human resource management methods.

Unit 1 **8**

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, Fayol's principles of management.

PLANT LAYOUT: Factors governing plant location, types of production, types of layouts, advantages and disadvantages of process layout and product layout, Fixed position layout, applications.

Unit 2 **7**

WORK STUDY: Importance, applications, work study, method study and time study(elementary treatment), work sampling, PMTS, micro-motion study, rating techniques, MTM, flow process charts, string diagrams and Therbligs.

PROJECT MANAGEMENT: Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

Unit 3 **7**

STATISTICAL QUALITY CONTROL: Quality control, and its importance, SQC, attribute sampling inspection with single and double sampling, Control charts X and R charts and their applications, simple numerical examples. Inventory, types of Inventories, Inventory control, EOQ, Inventory control techniques, ABC,VED,FSN,SOS,GOLF Analysis.

TOTAL QUALITY MANAGEMENT: Elements of TQM – Continuous Improvement zero defect concept, quality circles, implementation, applications, ISO quality systems. Six Sigma–definition, basic concepts

Unit 4 6

FINANCIAL MANAGEMENT: Scope and nature of financial management, Sources of finance, Ratio analysis, Management of working capital, Nature of Investment Decisions – Investment Evaluation criteria- NPV, IRR, PI, Payback Period, and ARR, numerical problems.

MARKETING: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Unit 5 6

HUMAN RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, and types.

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management

Prescribed Textbooks:

1. O.P Khanna, Industrial Engineering and Management, Dhanpat Rai Publications (P) Ltd, 2018
2. Martand Telsang, Industrial Engineering and Production Management, S.Chand & Company Ltd. New Delhi, 2006

Reference Books:

1. M.Mahajan Industrial Engineering and Production Management, Dhanpat Rai & Co (P) Ltd, 2000
2. Bhattacharya DK, Industrial Management, S.Chand, publishers, 2010
3. J.G Monks, Operations Management, 3/e, McGraw Hill Publishers1987
4. T.R. Banga, S.C.Sharma, N. K. Agarwal, Industrial Engineering and Management Science, Khanna Publishers, 2008
5. Koontz O'Donnell, Principles of Management, 4/e, McGraw Hill Publishers, 1968
6. R.C.Gupta, Statistical Quality Control, Khanna Publishers, 1998

Web Resources:

1. https://www.youtube.com/watch?v=ckiMUG2imuM
2. https://youtu.be/4vq0FKWYud8
3. https://youtu.be/zdLWc9zs77Q
4. https://youtu.be/-TDh-5n90vk
5. https://youtu.be/BWbnKgFNcKg
6. https://youtu.be/_iWJzSp_foE
7. https://youtu.be/i0az1n2JXWE?list=PLLhSIFfDZcUWJ21H8KS5sXMpNGtMHPTYt
8. https://youtu.be/ogQhY8aiq90
9. https://youtu.be/aPEUKLxxh_k
10. https://youtu.be/RIYJmIS4gPs

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2
24AHS4BT.1	2	2	2	2	-	-	-	-	-	-	-	2	2
24AHS4BT.2	3	2	2	2	-	-	-	-	-	-	-	1	1
24AHS4BT.3	2	2	2	2	-	-	-	-	-	-	-	1	1
24AHS4BT.4	3	2	2	2	-	-	-	-	-	-	-	2	2
24AHS4BT.5	2	2	2	2	-	-	-	-	-	-	-	2	2

17/6/25 17/6/25 17/6/25 (C. Thiruppathirajah)

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
RAJAMPET, Annamayya District, AP-516126, INDIA

Department of Humanities & Sciences

Date: 28-06-2025

To
The Head of the Department
Mechanical Engineering (ME)
Annamacharya University
Rajampet

Dear Sir/Madam,

Subject: Submission of H&S Courses Offered to ME Department for 2nd Year (III & IV Semesters) - Reg.

I am writing to bring to your kind attention that the Department of Humanities and Sciences (H&S) will be offering the following courses to the ME department in the 2nd year, for both the III and IV semesters. These courses have been discussed and approved in the 2nd Board of Studies (BOS) meeting.

The list of approved courses is as follows:

B.Tech. III Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT31T	Complex Variables & Partial Differential Equations	3	0	0	3
2	MC	24AENS31T	Environmental Science	2	0	0	0

B.Tech. IV Semester

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT41T	Probability & Statistics	3	0	0	3
2	HSM	24AUHV41T	Universal Human Values-II	3	0	0	3

We request you to kindly consider these courses in the curriculum structure of the ME department for the academic year 2025-2026.

Thank you for your attention and cooperation. Please feel free to contact me for any further clarifications.

With Regards,

Dr. L. Obulapathi
Head of the Humanities and Science
Annamacharya University
Rajampet

Enclosure:

1. Syllabus copy of Complex Variables & Partial Differential Equations
2. Syllabus copy of Environmental Science
3. Syllabus copy of Probability & Statistics Universal Human Values-II (UHV-II)
4. Syllabus copy of Universal Human Values-II (UHV-II)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course	Probability and Statistics
Category	BS&H
Couse Code	24AMAT41T
Year	II Year
Semester	II Semester
Branch	CSE, AIDS, AIML, CSE (AI), CSE (DS), CSE(AIML), CSE(IOT), ME, CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Outcomes:

Upon successful completion of this course the student should be able to — Blooms Level of Learning

1. apply the concepts of probability theorems in stochastic process — L3
2. apply the probability distribution in real life problems — L3
3. calculate the correlation between two variables — L3
4. evaluate the hypotheses of large samples — L4
5. evaluate the hypotheses of small samples — L4

Unit 1: Probability — 10 hrs

Probability - axioms of probability – addition theorem of probability - conditional probability-multiplication theorem of probability (without proof) - Baye's theorem.
Random variables - discrete and continuous - Distribution functions - Mean and Variance.

Unit 2: Probability distributions — 8 hrs

Probability distributions – Binomial and Poisson distribution - fitting - normal distribution - their properties.

Unit 3: Introduction of statistics — 8 hrs

Introduction of Statistics – Mean - Median and Mode for ungrouped and grouped data.
Correlation - correlation coefficient : Karl Pearson's coefficient - Spearman's rank correlation

Unit 4: Estimation and Testing of hypothesis for large samples — 10 hrs

Estimation - Point estimation - interval estimation of one mean (small and large) - one Proportion (large).
Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).

Unit 5: Testing of hypothesis for small samples — 8 hrs

Student t-distribution test for single mean - two means and paired t-test,
Testing of equality of variances (F-test) - χ^2 test for goodness of fit - χ^2 test for independence of attributes.

Textbooks:

1. Miller and Freund, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

3. T. K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, Probability and Statistics, 2nd edition, S. Chand, 2010.

CO-PO Mapping:

CO	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AMAT41T.1	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.2	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.3	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.4	3	3	1	2	-	-	-	-	-	-	-
24AMAT41T.5	3	3	1	2	-	-	-	-	-	-	-

II B.Tech

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Universal Human Values-II
Category:	Humanities
Course Code:	24AUHV31T/24AUHV41T
Branches:	
Semester:	I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to help students recognize the vital interplay between values and skills, promoting sustained happiness and prosperity. It seeks to foster a holistic perspective on life and profession, encouraging value-based living through a clear understanding of human reality and existence. Additionally, the course emphasizes the ethical implications of such an understanding, fostering trustful behaviour, fulfilling human interactions, and a harmonious relationship with nature.

Course Outcomes:

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

1. comprehend the terms like Natural Acceptance, Happiness and Prosperity
2. analyze one's self, and one's surroundings (family, society, nature)
3. apply human values in enriching human relationships and human society.
4. analyze the need for universal human values and harmonious existence.
5. evaluate themselves as socially and ecologically responsible engineers.

Unit 1 Introduction to Value Education 12

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session1: Sharing about oneself
Lecture 3: Self-Exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations
Tutorial 2: Practice Session2: Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session3: Exploring Natural Acceptance

Unit 2 Harmony in the Human Being 8

Lecture 7: Understanding Human being as the co-existence of the self and the body.
Lecture 8: Distinguishing between the needs of the self and the body
Tutorial 4: Practice Session4: Exploring the difference of needs of self and body.
Lecture 9: The body as an instrument of the self
Lecture 10: Understanding harmony in the self
Tutorial 5: Practice Session5: Exploring sources of imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and health
Tutorial 6: Practice Session 6: Exploring harmony of self with the body

Unit 3 Harmony in the Family and Society 8

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session9: Exploring systems to fulfil human goal

Unit 4 Harmony in the Nature/Existence 10

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, Self-Regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session 10: Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session11: Exploring Co-existence in Existence

Unit 5 Implications of the Holistic Understanding – A Look at Professional Ethics 10

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session 12: Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session13: Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session14: Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance
Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the Difference of Needs of Self and Body
PS5 Exploring Sources of Imagination in the Self
PS6 Exploring Harmony of Self with the Body
Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal
Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence
Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

Prescribed Textbooks:

1. **The Textbook** - R R Gaur, R Asthana, G P Bagaria. *A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. The Teacher's Manual - R R Gaur, R Asthana, G P Bagaria. *Teachers' Manual for A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. A. Nagaraj. *Jeevan Vidya: Ek Parichaya.* Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi. *Human Values.* New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. *The Story of My Experiments with Truth*
5. E. F Schumacher. *Small is Beautiful*

Web Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf
4. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
5. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202325%20Ethics%20v1.pdf
6. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview
7. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

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 teamwork	Communication	Project management and finance	Life-long learning
24AUHV31T/41T.1			-	-	-	-	3	-	1	-	2
24AUHV31T/41T.2			-	-	-	-	3	-	1	-	2
24AUHV31T/41T.3			-	-	-	-	3	-	1	-	2
24AUHV31T/41T.4			-	-	-	-	3	-	1	-	3
24AUHV31T/41T.5			-	-	-	2	3	-	1	-	2

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Fluid Mechanics and Hydraulic Machines
Category:	PCC
Semester:	IV Semester
Couse Code:	24AMEC42T
Branch/es:	MECHANICAL ENGINEERING

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Impart the knowledge of fluid statics and kinematics.
2. Gain knowledge on fluid dynamics.
3. Understand the Hydro Electric power plant and importance of impact of jet on vanes.
4. Familiarize about different types of turbines and their performance characteristics.
5. Acquire knowledge on pumps and their performance characteristics.

Course Outcomes:

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

1. Solve the problems on properties of fluids under static and kinematic conditions.
2. Calculate the properties of fluids and losses in pipes under dynamic conditions.
3. Calculate the force exerted by the jet on vanes at different positions.
4. Solve the problems on performance parameters of different turbines.
5. Calculate the performance of the different types of Hydraulic Pumps.

Unit 1 Fluid Statics & Fluid Kinematics **10**

Dimensions and units: physical properties of fluids- specific gravity, viscosity, Newton's law of viscosity and surface tension vapour pressure - atmospheric gauge and vacuum pressure – measurement of pressure Piezometer, U-tube and differential manometers – Buoyancy (elementary treatment).

Fluid Kinematics: Stream line, path line, streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & Irrotational flows. Equation of continuity for one dimensional flow.

Web resources

Unit 2 Fluid Dynamics & Closed Conduit Flow **8**

Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, Applications of Bernoulli's equations- Measurement of flow: Pitot tube, Venturi meter and orifice meter. Momentum equation and its application on force on pipe bend. Vortex flow-Free and forced (Elementary Treatment).

Closed Conduit Flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel.

Unit 3 Boundary Layer **8**

Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer.

Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

Unit 4 Hydraulic Turbines **10**

Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency. Performance of Hydraulic Turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, water hammer.

Unit 5 Hydraulic Pumps **11**

Classification of pumps. Centrifugal pumps: Working, work done – manometric head, losses and efficiencies, specific speed, pumps in series and parallel. Performance - characteristic curves, NPSH.
Reciprocating Pumps: Working, Discharge, slip, ideal indicator diagram.

Prescribed Textbooks:

1. Fluid Mechanics and Hydraulic machines by Dr. R.K. Bansal latest edition November 2023
2. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N. Modi and Dr. S.M. Seth latest edition January 2019

Reference Books:

1. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering. Kotaria & Sons – 2013 edition
2. D. Rama Durgaiah, Fluid Mechanics and Machinery. New Age International, 1st edition – 2002
3. Banga & Sharma, Hydraulic Machines. Khanna Publishers.
4. James W. Dally, William E. Riley, Instrumentation for Engineering Measurements. John Wiley & Sons Inc, 2nd edition – 2010

WEB Resources :

i) https://www.youtube.com/watch?v=whCu4Xl3m98
II) https://www.youtube.com/watch?v=DW4rltB20h4
III) https://www.youtube.com/watch?v=GgVCTNCwfQk
iv) https://www.youtube.com/watch?v=GQHCnWl2U6I
v) https://www.youtube.com/watch?v=LCzIk0VDVQc

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	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC42T.1	3	2	2	2	-	-	-	-	-	-	-	1	1
24AMEC42T.2	3	2	2	2	-	-	-	-	-	-	-	1	1
24AMEC42T.3	3	2	2	2	-	-	-	-	-	-	-	2	2
24AMEC42T.4	3	2	3	2	-	-	-	-	-	-	1	2	2
24AMEC42T.5	3	2	3	2	-	-	-	-	-	-	1	2	2

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course: Theory of Machines
Category: PC
Semester: IV
Couse Code: 24AMEC43T
Branch/es: ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	1	0	3

Course Objectives:

1. To know the various basics related to simple mechanisms and their inversions.
2. To understand the velocity and acceleration in simple mechanisms and also effects of gyroscopic couple.
3. To familiarize the different gears and gear trains.
4. To apply the different balancing methods for rotating and reciprocating masses.
5. To understand the different vibrations and its natural frequencies for single degree of freedom system.

Course Outcomes:

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

1. Analyze different mechanisms, inversions of different kinematic chains and mobility of mechanisms
2. Analyze the velocity and acceleration diagrams of simple plane mechanisms by using relative velocity method and understand the effects of gyroscopic principle.
3. Analyze the phenomenon of interference in gears and velocity ratio of gear trains.
4. Estimate the balancing masses for rotating and reciprocating members in automotive applications.
5. Analyze the natural frequencies of mechanical systems based on governing equations.

Unit 1 **09**

Simple Mechanisms : Kinematic Link-Types of Links-Types of constraint motions-Classification of Kinematic Pairs – Kinematic Chain-Degree of freedom – Grashof's law-Inversions of four bar chain ,single and double slider crank mechanisms- Description of straight line mechanisms – Peacellier and Harts mechanism- Steering gear mechanism: Ackerman, Davis steering mechanisms.

Unit 2 **10**

Velocity and Acceleration analysis: Velocity analysis of simple mechanisms using relative velocity method-rubbing velocity– Acceleration analysis of simple mechanisms – four bar chain – single slider crank chain -Coriolis component of acceleration.

Gyroscope: Principle of gyroscope-gyroscopic couple- gyroscopic effect in an aero plane, ship- simple Problems.

Unit 3 **09**

Gears: Gear terminology-classification of toothed wheels -Involute and cycloidal gear profiles- law of gearing – interference in involute gears -Length of path of contact- arc of contact- contact ratio –

Gear trains- Types of gear trains –epicyclic gear trains-simple problems

Unit 4 **10**

Balancing of Rotating masses: Need for balancing, balancing of single mass and several masses indifferent planes, using analytical and graphical methods.

Balancing of Reciprocating masses: Primary and Secondary balancing of reciprocating masses – graphical Method – balancing of locomotives – variation of tractive force, swaying couple, hammer blow.

Unit 5 09

Vibrations: Introduction-Types of vibratory motion-Types of free vibrations-Natural frequency of free longitudinal vibrations-equilibrium method and energy method –Transverse vibrations –Dunkerly's method-Whirling speed of shafts- simple systems (Cantilever and Simply supported beams).
Torsional vibrations - Natural frequency of torsional vibration- Single rotor, and Two-rotor system.

Prescribed Textbooks:

1. P.L. Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers.
2. S.S. Rattan, Theory of Machines, 4/e, Tata McGraw Hill.

Reference Books:

1. J.E. Shigley, Theory of Machines and Mechanisms, 4/e, Oxford.
2. R.S.Khurmi &J.K.Gupta, Theory of Machines, S. Chand Publications.
3. Thomas Bevan, Theory of Machines, 3rd edition, CBS Publishers & Distributors, .
4. Jagadishlal, Theory of Mechanisms and Machines, Metropolitan Company Pvt Ltd.
5. R.K.Bansal, Theory of Machines, Lakshmi Publications.

Web Resources:

1. NPTEL :: Mechanical Engineering - Theory Of Mechanisms
2. Theory of Machine 02 | Simple Mechanism Part-2 - Question Practice Series | Abhyas | ME | GATE
3. Lecture 26: Analytical Velocity Analysis – III
4. Lecture 42 : Gears: Basic Concepts
5. Module 4 Lecture 1 Balancing of Single Slider Machines
6. NPTEL :: Mechanical Engineering - Mechanical Vibrations

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	PSO 1	PSO 2
24AMEC43T.1	3	3	2	2	-	-	1	-	1	-	1	1	2
24AMEC43T.2	3	3	2	2	-	-	1	-	1	-	1	3	2
24AMEC43T.3	3	3	2	2	-	-	1	-	1	-	1	2	1
24AMEC43T.4	3	3	2	2	-	-	1	-	1	-	1	2	3
24AMEC43T.5	3	3	2	2	-	-	1	-	1	-	1	1	2

17/6/25

17/6/25

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course: Thermal Energy Systems
Category: PCC
Semester: IV Semester
Couse Code: 24AMEC44T
Branch/es: MECHANICAL ENGINEERING

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Familiarize about the Rankine cycle used for steam power plant & steam boilers.
2. Impart knowledge on the working of nozzles and condensers used in steam power plants.
3. Impart knowledge on the working of steam turbines.
4. Understand the principle and operation of various Refrigeration methods.
5. Acquire knowledge on different Psychometric Processes & Air conditioning systems.

Course Outcomes:

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

1. Calculate the efficiency of Rankine cycle and summarize the working of different boilers used in steam power plant.
2. Analyze the flow through Nozzles and condensers used in steam power plant.
3. Solve the performance parameters of Steam Turbines.
4. Explain various refrigeration methods for specific uses.
5. Analyze various heat load concepts using RSHF and GSHF using psychrometric processes for different air conditioning systems.

Unit 1 Introduction to steam power plant **10**

Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration – reheating.

Boilers: Classification based on Working principles - Fire tube and water tube boilers – High pressure Boilers.

Unit 2 Steam Nozzles & Condensers **10**

Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit- Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio.

Condensers: Requirements of steam condensing plant, rare fraction – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its effects.

Unit 3 Steam Turbines **10**

Classification of steam turbines -impulse turbine and reaction turbine -compounding of turbines - velocity diagrams for impulse and reaction turbines, efficiency, degree of reaction - governing of turbines.

Unit 4 Refrigeration **12**

Introduction To Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. – Different refrigeration methods - **Air Refrigeration:** Ideal and Actual cycles – Refrigeration needs of Air craft's. Types. Simple air cooling system and Boot Strap air cooling system (elementary treatment).

Vapour Compression Refrigeration: Basic cycle - working principle and essential components of the plant – COP – Expander vs. Throttling, effect of sub cooling and super heating – numerical Problems.

Vapour Absorption Refrigeration System: Description and working of NH_3- water system, Li Br –water (Two shell) System, Principle of operation of three Fluid absorption systems, properties of common refrigerants.

Unit 5 Air Conditioning **12**

Psychometric Properties & Processes – Need for Ventilation, Consideration of Infiltrated air – Heat Load concepts: RSHF, GSHF- Problems. Requirements of human comfort and concept of Effective Temperature-Comfort chart –Comfort Air Conditioning-Summer, winter & year round air conditioning systems (elementary treatment).

Prescribed Textbooks:
1. Thermal Engineering, R.K. Rajput, S.Chand & Co., 10th edition 2020, Laxmi publications, ISBN-9788131808047
2. Refrigeration and Air Conditioning by C P Arora, 4th Edition 2021. ISBN-13 : 978-9390385843

Reference Books:
1. Thermodynamics: An Engineering Approach, Cengel .Y.A and Boles M.A, 5/e, McGraw-Hill, 9th Ed 2019, ISBN-13 : 978-9339221652
2. A Textbook of Thermal Engineering by R. S Khurmi & JS Gupta, S.Chand, 16th Ed.2020, ISBN 9788121925730
3. A Course In Refrigeration And Air-Conditioning By Domkundwar, Arora, Domkundwar, 2022. ISBN-13 : 978-1111644475
4. A text book of Refrigeration and Air Conditioning by R.K Rajput , S K Kataria & sons, 3rd Edition 2015. ISBN-13 : 978-93-5014-255-4

Web links:

- https://archive.nptel.ac.in/courses/112/107/112107291/
- https://youtu.be/DuLFDzQVTU4
- https://youtu.be/h1Yt4ibYXfA
- https://archive.nptel.ac.in/courses/112/107/112107216/
- https://archive.nptel.ac.in/courses/112/105/112105128/

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	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC44T.1	3	3	2	3	-	-	-	-	-	-	1	2	1
24AMEC44T.2	3	2	2	2	-	-	-	-	-	-	1	2	1
24AMEC44T.3	3	3	2	3	-	-	-	-	-	-	1	2	1
24AMEC44T.4	3	2	2	1	-	-	-	-	-	-	2	2	2
24AMEC44T.5	3	3	2	3	-	-	-	-	-	-	2	2	3

17/6/25 17/6/25 17/6/25 (Ramanjaneyulu.C)

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Title of the Course:	Fluid Mechanics and Hydraulic Machines Lab
Category:	PCC
Semester:	IV Semester
Couse Code:	24AMEC41L
Branch/es:	MECHANICAL ENGINEERING

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To provide knowledge in verifying Bernoulli's Theorem.
2. To impart knowledge in fluid flow measuring devices like Venturimeter & Orifice meter.
3. To understand frictional losses in pipes with various diameters.
4. To understand impact of jet on vanes like flat vane & semicircular vane.
5. To acquire knowledge about various hydraulic machines like centrifugal pump, reciprocating pump, Pelton wheel, Francis turbine, Kaplan turbine etc.

Course Outcomes:

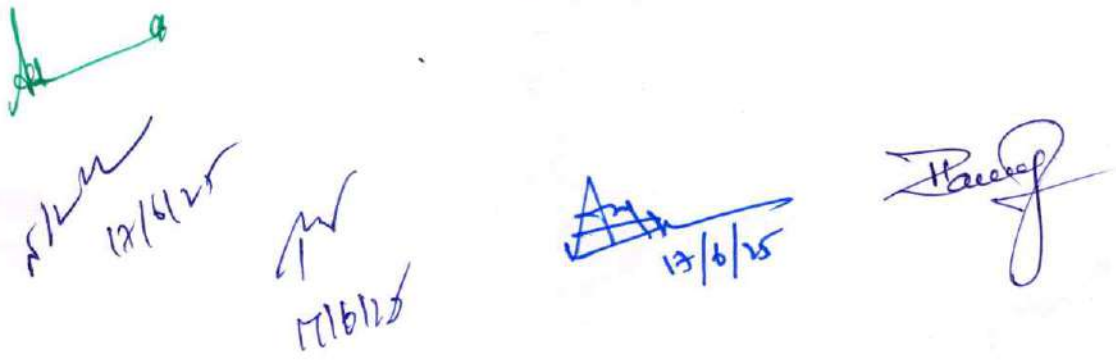
A student will be able to

1. Apply the Bernoulli's Theorem for different flow channels.
2. Calculate the flow rate of fluids by the instruments like Venturimeter and Orificemeter.
3. Calculate the frictional losses in pipes.
4. Evaluate impact of jet on vanes like Flat vane & Semi-circular vane.
5. Evaluate different performance parameters of hydraulic machines like pumps and turbines.

List of Experiments

1. Verification of Bernoulli's Theorem
2. Flow Through Venturimeter
3. Flow Through orifice meter
4. Determination of frictional losses in a given pile line.
5. Determination of loss of head due to sudden contraction in a pipeline.
6. Performance Test on Single Stage Centrifugal Pump
7. Performance Test on Multi Stage Centrifugal Pump
8. Performance Test on Reciprocating Pump
9. Impact of Jet on Vanes
10. Performance Test on Pelton Wheel
11. Performance Test on Francis Turbine
12. Performance Test on Kaplan Turbine
13. Turbine flow meter.

Note: Any 10 of the above 13 experiments are to be conducted.



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	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC41L.1	3	2	2	2	-	-	-	1	-	-	-	2	1
24AMEC41L.2	3	2	2	2	-	-	-	1	-	-	-	2	1
24AMEC41L.3	3	2	2	2	-	-	-	1	-	-	-	2	1
24AMEC41L.4	3	3	2	3	-	-	-	1	-	-	1	2	2
24AMEC41L.5	3	3	2	3	-	-	1	1	-	-	1	2	2

ANNAMACHARYA UNIVERSITY
EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY
(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Theory of Machines Lab
Category : PC
Semester: IV
Course Code : 24AMEC42L

Branch: ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
- To understand the fundamentals of the theory of kinematics and dynamics of machines.
- To understand techniques for studying motion of machines and their components.
- To understand the vibrational behavior of systems, principles of gyroscope and governors.

Course Outcomes:
At the end of the course, the student will be able to
- Analyze the different inversions of mechanisms.
- Apply the principles of gyroscopic effects and stabilization on various transport vehicles
- Analyze the characteristics of governors.
- Analyze the vibration parameters of different systems
- Analyze Tribological behaviour of materials

List of Experiments:
1. To study inversion of four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism.
2. To find experimentally the Gyroscopic couple on Motorized Gyroscope and compare with applied couple
3. Determination of characteristic curves of Watt Governor
4. To study various types of Cam and Follower arrangement.
5. To determine critical speed or whirling speed of a rotating shaft and to verify the value theoretically
6. Forced vibrations of a spring-mass system
7. Determination of Torsional natural frequency of two rotor system
8. Determination of damped natural frequency of Torsional vibrating system
9. To perform the experiment of Balancing of rotating parts and find the unbalanced couple and forces
10. To determine the Tribological properties (wear rate and coefficient of friction) of materials
11. Determination of characteristic curves of Proell Governor

Note: Any 10 experiments need to be performed

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMEC42L.1	3	3	2	3	-	-	1	-	-	-	-	3	3
24AMEC42L.2	3	3	2	3	-	-	-	-	-	-	-	3	3
24AMEC42L.3	3	3	2	3	-	-	-	-	-	-	-	2	2
24AMEC42L.4	3	3	2	3	-	-	-	-	-	-	-	3	3
24AMEC42L.5	3	3	2	3	-	-	-	-	-	-	-	2	2

17/6/25

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17/6/25

ANNAMACHARYA UNIVERSITY

Estd. under Andhra Pradesh Private Universities (Establishment and Regulation) Act, 2016

(Formerly Annamacharya Institute of Technology and Sciences, Rajampet)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

18.07.2025

To
The Head of the Department,
Mechanical Engineering,
Annamacharya University.

Subject: Forwarding of Python for Data Science Syllabus as Recommended by the Board of Studies of Computer Science and Engineering

Dear Sir,

This is to inform you that the syllabus for the subject **'Python for Data Science'** [24ACSE47L] II B. Tech II Semester ME Students offered by the Department of Computer Science and Engineering, has been prepared and duly recommended by the Board of Studies (BOS) of our department.

In this regard, we are forwarding the approved syllabus for your kind reference and necessary academic coordination, especially in case the subject is offered as skill course in your department.

We request you to kindly go through the syllabus and take note of the contents for your department's planning and alignment purposes.

Your cooperation in this academic matter is sincerely appreciated.

Thanking you.

With regards,

Dr. M. Subba Rao
Professor & Head,
Department of CSE,
Annamacharya University

Enclosure: Approved Syllabus
Copy to: Head, ME
Copy to: Dean, Academics
Copy to: Department for filing

ANNAMACHARYA UNIVERSITY
EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY
(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Python for Data Science
Category:	Skill Course
Couse Code:	24ACSE47L
Year	II B. Tech
Semester:	II Semester
Branch	Mech.

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will be able to

1. Develop proficiency in Python programming and NumPy for numerical computing
2. Utilize Pandas for data analysis and create insightful visualizations
3. Understand the fundamentals of Machine Learning

Course Outcomes: At the end of the course, the student will be able to

1. Write python programs using the core concepts like Lists, Dictionaries, sets, tuple, functions and regular expressions.
2. Demonstrate various mathematical operations on arrays using NumPy
3. Analyse and manipulate Data using Pandas
4. Creating static and interactive visualizations using Matplotlib
5. Enumerate machine learning algorithms, Describe the Classification and Clustering

Unit 1 Introduction to Python 10

Introduction to Python: Data Types: Strings, Numbers, Booleans, Date and Time, Lists, Tuples, Dictionaries, Operators, Conditional Statements, Loops, Functions, Modules and packages, Classes and Objects, Regular expressions

Unit 2 Introduction to NumPy 10

Introduction to NumPy: The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything in Between, Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data: NumPy's Structured Arrays.

Unit 3 Data Manipulation with Pandas 10

Data Manipulation with Pandas: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping Planets Data, Pivot Tables, Vectorized String Operations, High-Performance Pandas

1. 2. 3. 4.
5. 6. 7.

Unit 4 Visualization with Matplotlib 10

Visualization with Matplotlib: Two Interfaces for the Price of One, Simple Line Plots, Simple Scatter Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colorbars, Multiple Subplots, Text and Annotation, Customizing Ticks, Customizing Matplotlib: Configurations and Stylesheets, Three-Dimensional plotting in Matplotlib.

Unit 5 Introduction to Machine Learning 10

What Is Machine Learning?, Types of machine learning systems, Introducing Scikit-Learn, Feature Engineering, Model development, Linear Regression: Simple Linear Regression, Example of model development

Prescribed Text Book:

1. Python Data Science Handbook: Essential Tools for Working with Data, JakeVanderPlas, O'reilly publications, 2016

Reference Books:

1. Python® for Programmers, PaulDeitel, HarveyDeitel, Pearson Education, Inc,2019
2. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, David Dietrich, Barry Heller, Beibei Yang, Published by John Wiley & Sons, Inc, 2015

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
24ACSE37L-1	3	3	2	3	1	-	-	1	-	-	-	-	3	2
24ACSE37L-2	3	3	2	3	2	-	-	-	-	-	-	-	3	2
24ACSE37L-3	3	3	2	3	2	-	-	-	-	-	-	-	3	2
24ACSE37L-4	3	3	2	3	2	-	-	-	-	-	-	-	3	3
24ACSE37L-5	3	3	2	3	2	-	-	-	-	-	-	-	3	3

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

Annexure-III

Vision,Mission,Peo's, Pso's statements

Department of Mechanical Engineering

Vision

The Vision of the University is:

To be a globally recognized university by providing value-based education and promoting innovation and research for societal betterment.

Mission

The Mission of the University is:

1. To embody 'Vidwan Sarvatra Pujyathey'.
2. To deliver high-quality education by encouraging research, innovation, and critical thinking.
3. To nurture upright individuals by fostering an inclusive environment and inspiring service to society.

Department Vision

We envision the department as a premier knowledge center by integrating teaching, learning, and research to deliver impactful technical education and drive innovation for societal benefit.

Department Mission

M1: To establish an environment which provides an excellent academic standard to meet the industry requirements.
M2: To design the curriculum that incorporates current industrial requirement, modern technology and innovative thinking to solve the mechanical engineering problems.
M3: To inculcate ethical values, diversity, social responsibility and community services through curricular and extra-curricular activities.

Program Educational Objectives

PEO 1: Technologically competent enough to analyze, design and develop industrial solutions.
PEO 2: Engage in continuous learning and maintain the competency to work in multidisciplinary projects and be the leader in the technological society.
PEO 3: To solve the societal issues ethically and also work effectively as an individual or team.

Program Specific Outcomes

PSO1: Conceptualize, develop, analyze, and optimize various mechanical systems and elements to enhance their performance.
PSO 2: Excel in employment opportunities by applying mechanical knowledge and professional ethics to solve complex mechanical engineering problems.

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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

Annexure-IV

SDG's-CCI-IKS

BASIC THERMODYNAMICS

Contents	Sustainable Development Goals	Indian Knowledge System	Cross-cutting issues.
Basic Concepts & First Law of Thermodynamics-Unit-I	SDG 7: Affordable and Clean Energy	Energy transformations.-(traditional cooking on clay stove, Bullock driven oil press)	Environment & sustainability, Professional ethics
Second Law of Thermodynamics-Unit-II	SDG 13: Climate Action SDG 7: Affordable and Clean Energy	Indian philosophies on entropy (The universe starts as **ordered (Satya Yuga)** and declines into **disorder (Kali Yuga)**	Environment & sustainability, Professional ethics
Pure Substances-Unit-III	SDG 9: Industry, Innovation, and Infrastructure	Application of traditional measurement methods (e.g., steam in Ayurvedic distillation)	Environmental sustainability Professional ethics,
Perfect Gas Laws & Gas Mixtures-Unit IV	SDG 7: Affordable and Clean Energy	Emphasizes a holistic and elemental approach to matter (via panchamahabhuta), aligning with how gases respond to energy and environment.	Gender equality
Air Standard Cycles (Otto, Diesel, Dual)-Unit V	SDG 9: Industry & Infrastructure SDG 13: Climate Action SDG 7: Affordable and Clean Energy	IKS provides a **holistic and philosophical framework** to view the scientific operations of Otto, Diesel, and Dual cycles. (Indian philosophy views life as a cycle of birth, death, and rebirth)	Environmental Sustainability, Human values, Development of Creative and Divergent Competencies

MANUFACTURING PROCESSES mapping with SUSTAINABLE DEVELOPMENT GOALS

Contents	Sustainable Development Goals	SDGs
Unit 1: Casting Original Topics: • Steps in casting, advantages, patterns, allowances, molding, cores. • Gating principles, risers, casting design, solidification, defects. • Special casting processes: centrifugal, die, investment, shell molding.	Added SDG Topics: • Eco-friendly molding and core materials for reducing environmental impact. • Sustainable casting design for material efficiency and waste reduction. • Energy consumption and carbon footprint analysis in casting processes. • Recyclability of casting materials and sand reuse practices	SDG 12 & 13
Unit 2: Welding Original Topics: • Types of welding and joints, gas welding, arc welding, TIG, MIG, resistance welding, etc. • Special welding techniques, heat-affected zones, pre/post heating, defects.	Added SDG Topics: • Low-energy welding techniques for sustainable fabrication (e.g., friction stir welding). • Health, safety, and environmental impacts of welding fumes and radiation. • Use of automation in welding to reduce human risk and material waste. • Sustainable material choices for electrodes and shielding gases	SDG 3, 9 & 12
Unit 3: Bulk Forming Original Topics: • Plastic deformation, hot/cold working, strain hardening. • Forging, rolling, extrusion, wire/tube drawing.	Added SDG Topics: • Energy efficiency in bulk forming operations. • Use of renewable energy in metal forming plants. • Recyclability of metals and alloys in bulk forming. • Sustainable lubrication practices to reduce pollution	SDG 7, 9 & 12
Unit 4: Sheet Metal Forming Original Topics: • Blanking, piercing, deep drawing, bending, coining, spinning. • High-energy rate forming (HERF): explosive, electromagnetic, rubber pad.	Added SDG Topics: • Minimizing material waste through precision sheet forming. • Lifecycle analysis of formed components to ensure sustainability. • Application of green manufacturing techniques in HERF. • Noise and vibration pollution control in high-energy processes.	SDG 11 & 12
Unit 5: Additive Manufacturing and Plastics Original Topics: • Additive manufacturing (AM): steps, classification, materials, types, post-processing, applications. • Plastics: properties, engineering applications, processing (injection, blow, extrusion, etc.).	Added SDG Topics: • Sustainable materials in AM, such as bioplastics and recycled polymers. • Energy and material optimization in 3D printing. • Environmental impact of plastic manufacturing and disposal. • Circular economy practices: plastic recycling and reuse strategies	SDG 9, 12 & 13

MANUFACTURING PROCESSES mapping with INDIAN KNOWLEDGE SYSTEMS

Contents	Traditional Practice or Knowledge	Modern Relevance
Unit 1 – Casting Processes	Dhokra lost-wax casting, Iron Pillar metallurgy	Eco-friendly molding, defect-free design
Unit 2 – Welding Techniques	Forge welding in blacksmithing, use of plant-based fluxes	Friction welding, TIG/MIG principles
Unit 3 – Forging & Rolling	Wootz steel, manual rolling in ornament making	Heat treatment, strain hardening
Unit 3 – Wire Drawing	Traditional jewelry wire drawing methods	Modern tube and wire drawing techniques
Unit 4 – Sheet Metal Forming	Brass utensil shaping in Moradabad	Precision sheet forming and bending
Unit 4 – High Energy Forming	Percussion forming methods in traditional crafts	High-energy forming processes
Unit 5 – Additive Manufacturing	Layer-wise clay pottery, terracotta modeling	3D printing and rapid prototyping
Unit 5 – Plastics & Molding	Use of lac, shellac, and natural resins	Biopolymers, sustainable plastics

MANUFACTURING PROCESSES mapping with CROSS-CUTTING ISSUES

Cross-Cutting Issue	Mapped Topics in Syllabus	Relevance and Justification
Environment and Sustainability	Unit 1 – Eco-friendly casting and sand reuse Unit 2 – Low-energy welding, gas handling Unit 3 – Recycling and energy optimization in bulk forming Unit 4 – Material waste reduction in forming Unit 5 – Use of biodegradable and recycled plastics in AM	Promotes sustainable manufacturing practices, resource conservation, and energy efficiency (SDGs 7, 9, 12, 13).
Human Values	Unit 1 – Traditional casting (Dhokra) Unit 3 – Wootz steel knowledge Unit 5 – Natural resin use in molding	Fosters respect for traditional knowledge, cultural continuity, and value-based learning aligned with NEP 2020.
Professional Ethics	Unit 2 – Welding safety and heat management Unit 3 – Defect control and responsible forming Unit 4 – Safe practices in high-energy forming	Encourages ethical decision-making, quality assurance, and safe engineering practices.
Development of Creative and Divergent Competencies	Unit 4 – Innovative forming processes (e.g., electromagnetic forming) Unit 5 – Additive Manufacturing and prototyping	Supports design thinking, creative application, and multidisciplinary innovation.
Gender Sensitivity	Unit 1 / 3 / 5 – Can incorporate examples of women artisans in traditional metalwork, molding, and AM labs	Not directly in syllabus but can be promoted via inclusive teaching practices and representation of women's contributions.

Material Science and Metallurgy mapping with SUSTAINABLE DEVELOPMENT GOALS

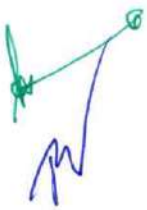
Unit	Core Topics	SDG	Justification / Added Focus
Unit 1	Crystallization, alloys, grain structure, solid solutions	SDG 4, SDG 9	Strengthens foundational knowledge to develop new materials for industry and research.
Unit 2	Phase diagrams, transformations, Fe-C diagram	SDG 9, SDG 12	Enhances materials optimization and reduces waste via predictive phase modeling.
Unit 3	Ferrous and non-ferrous alloys	SDG 11, SDG 13	Contributes to sustainable infrastructure and lower-emission transportation via material selection.
Unit 4	Heat treatment, TTT, hardening, surface treatments	SDG 9, SDG 12	Supports sustainable manufacturing and extends material life.
Unit 5	Powder metallurgy, ceramics, composites	SDG 3, SDG 9, SDG 12	Promotes use of biocompatible materials, recyclability, and energy-efficient production.

Material Science and Metallurgy mapping with INDIAN KNOWLEDGE SYSTEMS

Unit	Traditional Knowledge	Modern Relevance
Unit 1	Ancient Indian metallurgical practices – Iron Pillar of Delhi, zinc distillation in Zawar	Insight into corrosion resistance, solid solution behavior
Unit 2	Wootz steelmaking – crucible process	Foundation for modern alloy development and phase control
Unit 3	Traditional bronze casting (e.g., Dhokra art)	Links to casting microstructures and alloy tailoring
Unit 4	Blacksmithing heat treatment	Basis for understanding annealing, hardening, tempering
Unit 5	Use of natural resins, earthen materials	Precursors to modern composites and eco-materials

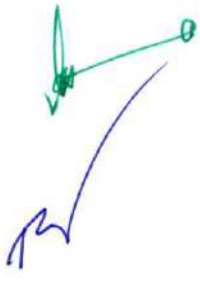
Material Science and Metallurgy mapping with CROSS-CUTTING ISSUES

Cross-Cutting Issue	Mapped Units / Topics	Relevance and Justification
Environment & Sustainability	Units 3, 4, 5 – Alloy selection, heat treatment efficiency, composites	Promotes long-lasting materials and low-carbon footprint alternatives
Human Values / Traditional Knowledge	Units 1, 2, 5 – Indian metallurgical heritage and eco-materials	Encourages respect for indigenous practices and value-based learning
Professional Ethics	Units 3, 4 – Defect prevention, responsible alloying, safe heat treatments	Fosters quality assurance, safety, and ethical engineering choices
Innovation and Creativity	Units 4, 5 – Cryogenic treatment, composites, sintering	Supports creative solutions, lightweight design, and prototyping culture
Gender Sensitivity	Include examples of women in metallurgy R&D, ancient crafts	Promotes inclusive teaching and awareness of contributions across gender lines



Mechanics of Solids

Units	Contents	Sustainable Development Goals	Indian Knowledge System	Cross-cutting issues relevant to the current and pressing concerns both nationally and internationally, such as gender, environment and sustainability, human values, professional ethics, and development of creative and divergent competencies.
Unit 1	**Simple Stresses & Strains** Elasticity, Hooke's Law, stress-strain diagram, thermal stresses, strain energy, Mohr's Circle.	**SDG 4** – Quality Education **SDG 9** – Industry, Innovation, and Infrastructure	Traditional materials used in Indian construction (e.g., bamboo, lime mortar), concepts of balance in ancient Indian engineering.	Professional ethics : In structural design; sustainability of traditional vs modern materials.
Unit 2	**Shear Force and Bending Moment** Beams, SFD & BMD for various loading conditions.	**SDG 9** – Innovation in structural design **SDG 11** – Sustainable Cities and Communities	Use of beams in ancient Indian architecture (temples, stepwells), knowledge of load distribution.	Development of creative and divergent competencies. Neutral design thinking; inclusivity in infrastructure projects.
Unit 3	**Bending & Shear Stresses** Theory of bending, shear stress distribution in beams.	**SDG 12** – Responsible Consumption and Production	Structural geometry in Indian architecture (lotus domes, jalis), optimized material usage.	Sustainability: Efficient use of cross-sectional shapes.
Unit 4	**Deflection of Beams** Double integration and Macaulay's methods, elastic curve.	**SDG 4** – Quality Education **SDG 13** – Climate Action	Historical understanding of load-bearing structures and deflection in Indian palaces.	Professional ethics: Promotes creativity in mechanical modeling and ethical responsibility for public safety.
Unit 5	**Thin and Thick Cylinders** Stress analysis, Lame's equations, volumetric changes.	**SDG 9** – Infrastructure Resilience **SDG 12** – Sustainable Production	Ancient Indian water storage and pressure vessel techniques (step wells, tanks).	Sustainability: Importance of safe design in pressurized systems for industrial sustainability.



Mechanics of Solids laboratory

Contents	Sustainable Development Goals	Indian Knowledge System	Cross-cutting issues relevant to the current and pressing concerns both nationally and internationally, such as gender, environment and sustainability, human values, professional ethics, and development of creative and divergent competencies.
Tension Test, Torsion Test	SDG 9 – Industry, Innovation, and Infrastructure SDG 4 – Quality Education	Use of traditional ropes, rods, and load-bearing components in Indian construction and tools.	Professional Ethics : Professional Ethics In Experimental Procedure And Safety: Promoting Accurate Reporting And Teamwork.
Hardness Tests (Brinell, Rockwell, Vickers)	SDG 12 – Responsible Consumption and Production	Ancient metallurgy and tool-hardening methods from Indian blacksmithing traditions.	Environment And Sustainability: Sustainable Material Usage And Awareness Of Environmental Impact Of Material Processing.
Spring Testing, Deflection of Beams	SDG 9 – Sustainable Infrastructure SDG 11 – Sustainable Cities and Communities	Spring mechanisms in traditional Indian carts and architectural structures (step wells, domes).	Development Of Creative And Divergent Competencies : Fosters Innovation And Creativity In Energy-Efficient Mechanical Systems.
Compression Test, Impact Test (Charpy, Izod)	SDG 13 – Climate Action SDG 12 – Responsible Consumption	Ancient testing practices of stone durability in temples and water tanks.	Human Values : Emphasizes Resilience And Safety In Design; Human Values In Public Infrastructure.
Shear Test, Wear Test, Liquid Penetration Test	SDG 3 – Good Health and Well-being (Safety Testing) SDG 9 – Infrastructure Resilience	Material wear observations in ancient farming tools, plows, and transport systems.	Professional Ethics: Reinforces Ethical Responsibility In Industrial And Construction Practices; Inclusion Through Accessible Lab Learning.

Industrial Management mapping with SUSTAINABLE DEVELOPMENT GOALS

Unit	Core Topics	SDG	Justification / Added Focus
Unit 1	Industrial engineering principles, plant layout, productivity, scientific management	SDG 8, SDG 9	Promotes efficient industrial systems, productivity, and sustainable infrastructure development.
Unit 2	Work study, time and motion study, project management	SDG 8, SDG 12	Supports productivity optimization and efficient project execution in industries.
Unit 3	Statistical quality control, TQM, inventory control	SDG 9, SDG 12	Ensures quality assurance, resource efficiency, and waste reduction.
Unit 4	Financial management, marketing management	SDG 8, SDG 9	Fosters financial sustainability and market-responsive product development.
Unit 5	HRM, job evaluation, value analysis, ERP, SCM	SDG 5, SDG 9	Supports inclusive workforce management and optimized resource planning.

Industrial Management mapping with INDIAN KNOWLEDGE SYSTEMS

Unit	Traditional Knowledge	Modern Relevance
Unit 1	Ancient guilds and decentralized industries (e.g., weavers, blacksmiths)	Foundational management principles and industrial organization
Unit 2	Timekeeping in ancient Indian crafts and temple architecture planning	Basis for modern work study and project planning methods
Unit 3	Traditional quality control in handloom and Ayurveda practices	Early forms of quality assurance and process consistency
Unit 4	Community-based finance systems like hundi and barter systems	Insights into cash flow management and resource allocation
Unit 5	Village cooperatives and barter networks	Inspiration for modern supply chains and human-centric resource management

Industrial Management mapping with CROSS-CUTTING ISSUES

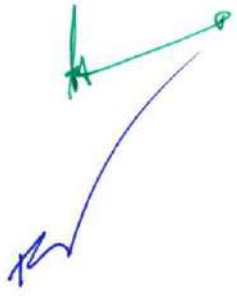
Cross-Cutting Issue	Mapped Units / Topics	Relevance and Justification
Environment & Sustainability	Unit 2, 3 – Work and inventory optimization, quality management	Promotes reduced resource wastage and sustainable operational practices.
Human Values / Traditional Knowledge	Units 1, 2, 5 – Ancient guilds, cooperatives, planning	Encourages respect for indigenous systems and cultural continuity.
Professional Ethics	Units 3, 5 – Quality standards, HR ethics, incentive planning	Ensures ethical decision-making and fair labor practices.
Innovation and Creativity	Units 2, 4 – Project planning and marketing strategies	Supports innovative planning and value-driven market approaches.
Gender Sensitivity	Unit 5 – HRM and inclusive practices	Encourages equal opportunity and diversity in workplace policies.

FLUID MECHANICS & HYDRAULIC MACHINES

Unit	Topic	Relevant SDGs	Indigenous Knowledge Systems (IKS)	Cross-Cutting Issues
Unit-I	Fluid Statics & Kinematics	SDG 4 (Quality Education), SDG 6 (Clean Water & Sanitation)	Traditional water level measurement (e.g., earthen pot methods, step wells)	Scientific inquiry, environmental sensitivity
Unit-II	Fluid Dynamics & Closed Conduit Flow	SDG 6, SDG 9 (Industry, Innovation, and Infrastructure)	Indigenous canal irrigation practices	Problem solving, sustainability, resource efficiency
Unit-III	Hydroelectric Power Stations & Jet Impact	SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action)	Indigenous water wheel systems in rural energy	Clean energy awareness, innovation, environmental ethics
Unit-IV	Hydraulic Turbines	SDG 9, SDG 12 (Responsible Consumption and Production)	Traditional turbine concepts in Himalayan water mills (gharaats)	Efficiency analysis, sustainable technology, design thinking
Unit-V	Hydraulic Pumps	SDG 6, SDG 9	Traditional water lifting systems (Persian wheels, treadle pumps)	Lifelong learning, teamwork, application-based understanding

Theory of Machines

Contents	Sustainable Development Goals	Indian Knowledge System	Cross-cutting issues relevant to the current and pressing concerns both nationally and internationally, such as gender, environment and sustainability, human values, professional ethics, and development of creative and divergent competencies.
Unit-I	Degree of freedom, Grashof's law, kinematic inversions of four bar chain, single and double slider crank chains. **[G9**:Industry,Innovation, and Infrastructure]	Degree of freedom, Grashof's law, Peacellier and Harts mechanism. **[IKS**-Mathematics]	Inversions of four bar chain ,single and double slider crank mechanisms **[Development of creative and divergent competencies]**
Unit-II	Principle of gyroscope, Gyroscopic effect in an aero plane, ship. **[G 14**: Life below water. **G 15**: Life on Land]	Relative velocity method, Coriolis component of acceleration **[IKS**-Mathematics]	Gyroscopic effect in an aero plane, ship. **[Environment and sustainability]**
Unit-III	classification of toothed wheels -Involute and cycloidal gear profiles, Types of gear trains – epicyclic gear trains **[G 7**: Affordable and Clean Energy]	Length of path of contact- arc of contact- contact ratio. **[IKS**-Mathematics]	Involute and cycloidal gear profiles **[Professional ethics]**
Unit-IV	balancing of single mass and several masses indifferent planes,Primary and Secondary balancing of reciprocating masses **[G 9**: Industry, Innovation, and Infrastructure]	Graphical Method, variation of tractive force, swaying couple, hammer blow. **[IKS**-Mathematics]	balancing of single mass and several masses indifferent planes,Primary and Secondary balancing of reciprocating masses **[Professional ethics]**
Unit-V	Natural frequency of longitudinal and transverse vibrations, torsional vibrations **[G 13:** Climate Action]	Equilibrium method and energy method. **[IKS**-Mathematics]	Types of vibratory motion **[Environment and sustainability]**



THERMAL ENERGY SYSTEMS

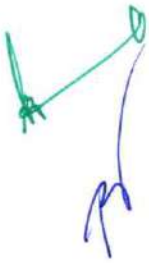
Unit	Topic	Relevant SDGs	Indigenous Knowledge Systems (IKS)	Cross-Cutting Issues
Unit-I	Steam Power Plant & Rankine Cycle	SDG 7 (Affordable & Clean Energy), SDG 9 (Industry, Innovation & Infrastructure)	Traditional steam-based practices (e.g., use of boilers in local jaggery units)	Energy efficiency, sustainability, thermodynamic literacy
Unit-II	Steam Nozzles & Condensers	SDG 13 (Climate Action), SDG 12 (Responsible Consumption & Production)	Indigenous condensation techniques in distillation (Ayurvedic medicine, rural alcohol distillation)	System efficiency, heat recovery, environmental consciousness
Unit-III	Steam Turbines	SDG 9, SDG 7	Use of mechanical water mills in hill regions (e.g., Himalayan *gharaats*) as turbine analogs	Innovation, mechanical design, applied fluid dynamics
Unit-IV	Gas Turbines & Jet Propulsion	SDG 9, SDG 11 (Sustainable Cities & Communities)	Local understanding of pressure dynamics (e.g., smoke channelling in traditional chimneys)	Technological awareness, propulsion systems in sustainable transportation
Unit-V	Refrigeration & Air Conditioning	SDG 3 (Good Health & Well-Being), SDG 11, SDG 13	Traditional cooling methods (e.g., *matka* cooling, mud pots, passive cooling using jalis and courtyards)	Climate responsiveness, health and comfort, eco-design

FLUID MECHANICS & HYDRAULIC MACHINES LAB

Experiment / Topic	Relevant SDGs	Indigenous Knowledge Systems (IKS)	Cross-Cutting Issues
Verification of Bernoulli's Theorem	SDG 6 (Clean Water & Sanitation), SDG 4 (Quality Education)	Traditional water transport & gravity-based irrigation systems	Scientific reasoning, water conservation
Flow Through Venturimeter / Orificemeter	SDG 9 (Industry, Innovation & Infrastructure)	Rural water distribution and irrigation flow control	Measurement systems, flow optimization
Frictional losses in pipes / sudden contraction	SDG 12 (Responsible Consumption & Production)	Local water supply pipelines using bamboo or clay	Material choice, efficiency, sustainability
Impact of Jet on Vanes	SDG 7 (Affordable & Clean Energy), SDG 13 (Climate Action)	SDG 7 (Affordable & Clean Energy), SDG 13 (Climate Action)	SDG 7 (Affordable & Clean Energy), SDG 13 (Climate Action)
Centrifugal / Multi-Stage / Reciprocating Pump Tests	SDG 6, SDG 9	Traditional hand pumps and Persian wheels for irrigation	Community access to water, efficient pumping technology
Performance Tests on Pelton / Francis / Kaplan Turbines	SDG 7, SDG 9	Local adaptations of waterwheel-based energy systems	Hydropower generation, sustainable development
Turbine Flow Meter	SDG 9, SDG 11 (Sustainable Cities)	Water usage metering in traditional agricultural setups	Conservation, technology adoption

Theory of Machines lab

Contents	Sustainable Development Goals	Indian Knowledge System	Cross-cutting issues
Kinematics and Dynamics of Machines (Inversions of mechanisms, Gyroscopic effects, Governors)	SDG 9 (Industry, Innovation, and Infrastructure) - Focus on mechanical systems and transport vehicles	Ancient Indian contributions to mechanics (e.g., concepts of motion in Jyotish Shastra, traditional machinery like water wheels).	Professional Ethics: Safety in mechanical design. Environment: Energy-efficient mechanisms.
Vibrational Analysis (Critical speed, Forced vibrations, Torsional systems)	SDG 7 (Affordable and Clean Energy) - Reducing energy loss in rotating systems. SDG 11 (Sustainable Cities) - Noise and vibration control in urban infrastructure.	Traditional methods for vibration damping (e.g., in temple architecture or musical instruments).	Sustainability: Minimizing wear and tear. Human Values: Precision and accuracy in measurements.
Tribology (Wear rate, Coefficient of friction)	SDG 12 (Responsible Consumption and Production) - Enhancing material longevity.	Use of natural materials (e.g., neem oil as lubricant in Ayurveda).	Environment: Eco-friendly materials. Gender: Inclusive design for ergonomic safety.
Governors and Stabilization (Watt Governor, Proell Governor)	SDG 4 (Quality Education) - Hands-on learning. SDG 13 (Climate Action) - Efficient energy use in machines.	Historical use of governors in Indian irrigation systems.	Creative Competencies: Innovative solutions for modern applications.
Balancing and Gyroscopic Effects	SDG 3 (Good Health) - Reducing mechanical hazards. SDG 8 (Decent Work) - Safe machinery operation.	Balance principles in yoga and traditional crafts (e.g., pottery wheels).	Ethics: Fair labor practices in machine maintenance. Team work: Collaborative experiments.



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

Annexure-V

AURAT

Pre-PhD Syllabus

ANNAMACHARYA UNIVERSITY: RAJAMPET
Ph.D Entrance Examination Syllabus
MECHANICAL ENGINEERING

Engineering Mechanics: Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations.

Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams, thermal stresses

Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; flywheels and governors; balancing of reciprocating and rotating masses.

Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

Machine Design: Basics of Engineering Drawing, Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears.

Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; viscous flow of incompressible fluids, elementary turbulent flow, flow through pipes, turbines.

Thermodynamics: Thermodynamic systems and processes; properties of pure substances, behaviour of ideal and real gases; zeroth law, first laws of thermodynamics, second law of thermodynamics; thermodynamic relations. Air standard cycles.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, heat transfer through fins; unsteady heat conduction; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer; radiation heat transfer.

Engineering Materials: Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

Production Engineering: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Fundamentals of hot and cold working processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding. Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear principles of non-traditional machining processes.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design. Alignment and testing methods

Operations Research: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

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Annexure-VI

List of Examiners

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
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RAJAMPET, Annamayya District, A.P – 516126, INDIA.

List of Examiners:

INDUSTRIAL MANAGEMENT

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Dr. P. Sivaiah	Assoc. Professor Madanapalle Institute of Technology & Science Madanapalle 9848360295, sivaiahp@mits.ac.in
2.	Dr.Ch.R.Vikram Kumar	Professor NBKRIST, Vidyanagar 9490321975 mehod@nbkrist.org

BASIC THERMODYNAMICS

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Prof. T. V. Rao	Principal DBS Institute of technology, kavali, nellore 9491924588
2.	Dr.V V N Bhaskar	Associate Professor Aditya college of Engineering, Madanapalle 9885094705
3	Dr. B. Sudheer Premkumar	Professor JNTUH, Kukatpally,.HYD 9849451103
4	Dr. T Hari prasad	Professor Mohanbabu University. Rangampet,,Tirupathi 7989768820

FLUID MECHANICS & HYDRAULIC MACHINES

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Dr K Dharma Reddy	Professor S V U College Of Engineering S V University 9494697899
2.	Dr.P.S.Ravi Kumar	Associate Professor NBKRIST, Vakadu, Nellore 9441147857
3	Dr. P. Venkata Ramaiah	Professor SVU College of Engineering S.V. University 9291602889
4	Dr. K.L Narasimhamu	Professor SVEC, Rangampet, Tirupati 9490247265

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

List of Examiners:

THEORY OF MACHINES

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1.	Dr.Y.Rameswar Reddy	Associate Professor, Department of Mechanical Engineering, JNTU College of Engineering , Pulivendula,-516390 YSR Kadapa (Dt) Contact No; 9666090727 , Email-id: yrameswarareddy.mech@jntua.ac.in
2.	Dr.P.Ravi Kumar	Professor, Department of Mechanical Engineering, CMR College of Engineering and Technology, Medchal Road,Seethariguda, Hyderabad,-501401 Email: pravikumar@cmrcet.ac.in Contact No: 9293139553, 9248001456
3.	Dr.K.Mallikarjuna	Professor, Department of Mechanical Engineering, G.Pullaiah College of Engineering and Technology, Nandikotkur Road, Pasupala Village, Kurnool,-518002 Email: mallikarjuna.gtl@gmail.com Contact No: 7660916753
4.	Dr.M.Chandrasekhar Reddy	Professor, Department of Mechanical Engineering, S.V.College of Engineering , Karambadi Road, TIRUPATI,-517501 Email: hod_me@svce.edu.in Contact No: 9912243800
5.	Dr.B.Sidda Reddy	Professor, Department of Mechanical Engineering, RGM College of Engineering and Technology, Nandyal -518501 Contact No: 9440844600

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List of Examiners:

THERMAL ENERGY SYSTEMS

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Dr.V V N Bhaskar	Associate Professor Aditya college of Engineering, Madanapalle 9885094705
2.	Dr B Satheesh Kumar	Associate Professor NBKRIST,, vakadu,Nellore 9440565424
3	Dr S Sunil Kumar Reddy	Professor Siddhartha Institute of technology and sciences, puttur 9441108348
4	Dr. H. Suresh Babu Rao	Associate Professor CBIT, Proddatoor, Kadapa dist. 9010825356

9/6/25

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List of Examiners:

MECHANICS OF SOLIDS

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Dr. A. Damodar Reddy	Associate Professor, Department of Mechanical engineering, JNTU College of Engineering, Pulivendula, 516390 YSR Kadapa(Dt) Ph No: 9492036921 Mail id: adamodarareddy@gmail.Com
2.	Dr B.Vinod	Associate Professor, Department of Mechanical engineering, Siddharth Institute of Engineering and Technology, Puttur. Ph No : 7702969673 Mail id: vinod.c2009@gmail.com
3	Dr. G V R Seshagiri Rao	Professor, Department of Mechanical engineering, IARE, Institute of Aeronautical Engineering, Hyderabad. Ph No: 9490074689 Mail id: gvr.seshagirirao@iare.ac.in
4	Dr T. Hari Prasad	Professor, Department of Mechanical engineering, Mohan Babu University, Rangampet, Tirupathi. Ph No: 9885404470 Mail id: hariprasad.t@mbu.asia
5	Dr K . Thirupathi reddy	Professor, Department of Mechanical engineering, RGM, Nandyala-518501 Ph No: 9441016367 Mail id: hme@rgmcet.edu.in

9/6/25

List of Examiners:

MATERIAL SCIENCE & METALLURGY

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
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3	Dr.A.Mahamani	Professor Sri Venkateswara college of engineering and Technology (Autonomous), RVS Nagar, Chittoor 8179101287, mahamanisudhan@gmail.com
4	Dr. N. Kiran Kumar	Associate Professor VNR Vignana Jyothi Institute of Engineering and Technology, Bachupalli, Hyderabad 9481523799, kirankumarn@vnrvjiet.in

MANUFACTURING PROCESSES

SNO	NAME OF THE EXPERT	DETAILS OF THE EXPERT
1	Dr. P. Hema	Professor Sri Venkateswara University College of Engineering, Tirupati, 9490247265, hema_pothur@yahoo.com
2.	Dr. K. Dharma Reddy	Professor Sri Venkateswara University College of Engineering Tirupati, 9494697899, 9493105099 kdharmareddy@gmail.com
3	Dr. P. Venkataramaiah	Professor Sri Venkateswara University College of Engineering Tirupati, 08772289445,pvramaiah@gmail.com
4	Dr.Ch.R.Vikram Kumar	Professor Department Of Mechanical Engineering NBKRIST, Vidyanagar 9490321975, mehod@nbkrist.org

9/6/25 9/6/25 9/6/25 9/6/25 9/6/25

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MECHANICAL ENGINEERING

Pre-PhD Examiners Details

Subject:3		
Name of the Subject with code	**Examiner**	**Phone no.**
Mechanics of Composite Materials- 24CMEC01T	Dr.S.Lakshmi Narayana, Associate Professor, MBU, Rangampet. lakshminarayana.s@mbu.asia	9030264524
	Dr. Syed Altaf Hussain, Professor, RGMCET,Nandyal, rgmaltaf1@gmail.com	9494738100
	Dr. K.Sudha Madhuri, Associate Professor, RGMCET,Nandyal, ksmadhurime@gmail.com	9505907474
Advanced Optimization Techniques- 24CMEC03T	Dr.A. Mahamani Professor Sri Venkateswara college of engineering and Technology (Autonomous), RVS Nagar, Chittoor Email: mahamanisudhan@gmail.com	8179101287
	Dr. K.L Narasimhamu,, Professor, MBU,Rangampet,Tirupati. Email:klsimha@gmail.com	9440941411
	Dr B Satheesh Kumar Associate Professor, NBKRIST,Vakadu,Nellore Email:satheeshkumar76svu@gmail.com satheeshkumar@nbkrist.org	9440565424
Experimental Methods in Thermal Engineering- 24CMEC02T	Dr. T Hari prasad Professor, MBU, Rangampet, Tirupati. E-mail:hariprasad.t@mbu.asia	7989768820
	Dr.T.V.Rao Principal, DBS Institute of technology, kavali, Nellore tvrao4@rediffmail.com	9491924588
	Dr. K.Dharma Reddy Professor, SVU.College of Engineering ,Tirupathi. Email:kdharmereddy@yahoo.co.in	9494697899
Intelligent Manufacturing Systems-24CMEC05T	Dr.Ch.R.Vikram Kumar, Professor, NBKRIST, Vidyanagar,	9490321975

	E-mail mehod@nbkrist.org	
	Dr. E Jaya Kiran Sreenidhi Institute of Science and Technology, Hyderabad E-mail:ejkiran@gmail.com Jayakiran.e@sreenidhi.edu.in	9963786665
	Dr P Venkataramaiah Professor College of Engineering, Sri Venkateswara University, Tirupathi	9291602889
Subject:4		
Advanced Materials Sciences & Engineering Process-24CMEC0QT	Dr. P. Sivaiah, Associate professor, Madanapalle Institute of Technology & Sciences, Madanapalle sivaiahp@mits.ac.in,	9848360295
	Dr B. Venkata Narayana Principal, S.E.A College of Engineering & Technology, K R Puram, Bangalore narayana.bv73@gmail.com	9448956755
	Dr A R Babu Professor, Sri Venkateswara college of engineering and Technology (Autonomous), RVS Nagar, Chittoor arbabu.1973@gmail.com	9985206973
Advanced Operations Management- 24CMEC0ET	Dr. P. Hema Professor & Head College of Engineering, Sri Venkateswara University, Tirupathi hemapothur@yahoo.com	9490247265
	Dr.A. Mahamani . Professor Sri Venkateswara college of engineering and Technology (Autonomous), RVS Nagar, Chittoor Email: mahamanisudhan@gmail.com	8179101287
	Dr. K.L Narasimhamu, Professor, MBU,Rangampet,Tirupati. Email:klsimha@gmail.com	9440941411
Advanced internal Combustion Engines- 24CMEC0ST	Dr.H.Suresh Babu Rao, Associate Professor, CBIT, Proddatoor,	9010825356

	Kadapa dist. Email: hsbr110479@gmail.com	
	Dr B. Veerabhadra Reddy, Professor, GPRCE,Kurnool, Email: tpo@gprec.ac.in	98855 99400
	Dr.VVN Bhaskar, Associate Professor, Aditya college of Engineering, Madanapalle Email: bhaskarvvn@gmail.com	9885094705
Surface Treatment & Finishing-24CMECOKT	Dr.G. JayachandraReddy Professor, YVUCE, Proddatoor, Email:jcr.yvuce@gmail.com	9441210045
	Dr B. Venkata Narayana Principal, S.E.A College of Engineering & Technology, K R Puram, Bangalore narayana.bv73@gmail.com	9448956755
	Dr.P.Sivaiah, Associate professor, Madanapalle Institute of Technology & Sciences, Madanapalle sivaiahp@mits.ac.in.	9848360295
Thermal Storage Systems-24CMECODT	Dr.VVN Bhaskar, Associate Professor, Aditya college of Engineering, Madanapalle Email: bhaskarvvn@gmail.com	9885094705
	Dr.Sunil Prayagi Professor, Yeshwant Rao chawan college of Engineering, Nagpur Email:sunil_prayagi@yahoo.com	9923172950
	Dr. K. Poli Reddy, Professor, GPRCE,Kurnool, Email: polireddyk01@gmail.com	8919014864
Technology of surface Coating-24CMECORT	Dr.R.MeenakshiReddy, G.Pullareddy College of Engineering, Kurnool Email:rmreddy123@gmail.com	9000321874
	Dr.Ch.R.Vikram Kumar, Professor, NBKRIST, Vidyanagar, E-mail mehod@nbkrist.org	9490321975
	Dr B. Venkata Narayana Principal, S.E.A College of Engineering & Technology, K R Puram, Bangalore	9448956755

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	narayana.bv73@gmail.com	

Gmail Hemanth Kumar <aits.med.ahk@gmail.com>

BOS-2 MINUTES, VISION MISSION STATEMENTS,SDGS,COURSE STRUCTURES,LIST OF EXAMINERS DETAILS

6 messages

B Santosh Kumar <aits.med.bsk@gmail.com> Thu, Jun 26, 2025 at 4:38 PM
To: B Santosh Kumar <aits.med.bsk@gmail.com>, Hemanth Kumar <aits.med.ahk@gmail.com>, Ajay Kumar Reddy <kakr.me@gmail.com>

Good afternoon sir,
pls find attached documents connecting to II B.Tech AU-R24 Regulations.
Regards
santosh

7 attachments

- **vision,mission statements.pdf** 378K
- **BoS-2 MoM.pdf** 725K
- **List of examiners for II B.Tech.pdf** 745K
- **pre-PhD List of examiners.pdf** 759K
- **AU R24 II Yr Course structure with syllabl.pdf** 2361K
- **2.8 Ph.D Entrance Syllabus.pdf** 172K
- **2.7 SDGs, IKS.pdf** 251K

Hemanth Kumar <aits.med.ahk@gmail.com> Thu, Jun 26, 2025 at 4:56 PM
To: durga.mech@jntua.ac.in, anil@littp.ac.in, veera.s@pennarindia.com, vdrsvuce@gmail.com, Surimisetty.balak@hcltech.com

Sir,
I hope this email finds you well. On behalf of Annamacharya University, we are delighted to thank you for attending the second BOS Meeting on 09-06-2025 to serve as an esteemed expert member of the Board of Studies in the Department of Mechanical Engineering. Your valuable suggestions are incorporated in the minutes of the BOS meeting, Please refer to the file attached to this email. This for your kind consideration and approval of the same.

Thanking you
with regards
Dr. Hemantha Kumar A
HOD
Annamacharya University,
Rajampet

5 attachments

vision,mission statements.pdf
378K

BoS-2 MoM.pdf
725K

pre-PhD List of examiners.pdf
759K

AU R24 II Yr Course structure with syllabi.pdf
2361K

2.8 Ph.D Entrance Syllabus.pdf
172K

DIWAKAR REDDY.V <vdrsvuce@gmail.com> Fri, Jun 27, 2025 at 10:12 AM
To: Hemanth Kumar <alts.med.ahk@gmail.com>

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
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TIRUPATI - 517 502
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[Quoted text hidden]

Anil Kumar <anil@iittp.ac.in> Fri, Jun 27, 2025 at 10:15 AM
To: Hemanth Kumar <alts.med.ahk@gmail.com>
Cc: durga.mech@jntua.ac.in, veera.s@pennarindia.com, vdrsvuce@gmail.com, Surimisetty.balak@hcltech.com

Approved from my end.

Thanks and regards

Dr. E. Anil Kumar
Professor
Department of Mechanical Engineering
Dean Sponsored Research and Consultancy
Indian Institute of Technology Tirupati
Yerpedu-Venkatagiri Road
Yerpedu Post – 517 619
Tirupati District, A.P.

Phone: 07879779188 (Mobile)
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To: Hemanth Kumar <alts.med.ahk@gmail.com>

approved

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Surimisetty Balakrishna <surimisetty.balak@hcltech.com> Fri, Jun 27, 2025 at 12:56 PM
To: Anil Kumar <anil@iittp.ac.in>, Hemanth Kumar <aits.med.ahk@gmail.com>
Cc: "durga.mech@jntua.ac.in" <durga.mech@jntua.ac.in>, "veera.s@pennarindia.com" <veera.s@pennarindia.com>, "vdrsvuce@gmail.com" <vdrsvuce@gmail.com>

Hello Sir,

Approved from my end!!

Regards,
Bala Krishna
HCLTech

From: Anil Kumar <anil@iittp.ac.in>
Sent: Friday, June 27, 2025 10:15:48 AM
To: Hemanth Kumar <aits.med.ahk@gmail.com>
Cc: durga.mech@jntua.ac.in <durga.mech@jntua.ac.in>; veera.s@pennarindia.com <veera.s@pennarindia.com>; vdrsvuce@gmail.com <vdrsvuce@gmail.com>; Surimisetty Balakrishna <surimisetty.balak@hcltech.com>
Subject: Re: BOS-2 MINUTES, VISION MISSION STATEMENTS,SDGS,COURSE STRUCTURES,LIST OF EXAMINERS DETAILS

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