

Annamacharya Institute of Technology & Sciences

(AUTONOMOUS)

New Boyanapalli, Rajampet – 516126

DEPARTMENT OF MECHANICAL ENGINEERING

Minutes of 14th BOS Meeting held on 16/05/2022

- The 14th Board of Studies was held in the department of mechanical engineering through online 'Microsoft teams' on 16.05.2022 at 11:30 AM.
- Agenda for individual meeting of Board of studies.
 1. To review the B.Tech. Programme R20 first year syllabus/course contents.
 2. To review the structure of 160 credits scheme (R20) with reference to core courses, professional electives (PECs), open electives courses (OECs) and skill bases/skill oriented/soft skills courses.
 3. To consider the revision in the courses and course scheme of Minor Programme.
 4. To consider the revision in the courses and course scheme of Honors Programme.
 5. To consider and approve the panel of examiners for external examination for the session 2022-23.
 6. Any other item with the permission of the chair.
- **Members Attended:**
 - **Chair Person:** Dr. A. Hemantha Kumar, Professor & Head, Dept. of Mechanical Engineering, AITS, Rajampet.
 - **Academic Experts:** Dr. G. Jaya Chandra Reddy, Professor & Head, Mechanical Engineering Dept., Y.S.R Engineering College of Yogi Vemana University, Proddatur.
 - **Academic Experts:** Dr. N. Venkaiah, Assoc. Professor of Mechanical Engineering, Dean of Students Affairs, Indian Institute of Technology Tirupati, Tirupati.
 - **University Nominee:** Dr. M. Ravi Sankar, Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology Tirupati, Tirupati.
 - **Industry Expert:** Mr. P. Balasankar, Automotive Engineer, Chennai.
 - **Internal Members:**
 - i. Dr. P. V. Sanjeev Kumar, Associate Professor, Dept. of Mechanical Engineering, AITS, Rajampet.
 - ii. Dr. B. Venkatesh, Associate Professor, Dept. of Mechanical Engineering, AITS, Rajampet.
 - iii. Mr. G. Suresh Babu, Assistant Professor, Dept. of Mechanical Engineering, AITS, Rajampet.

As per Agenda the following discussions happened:

1. R20_ME_first year course Structure and syllabus displayed and explained.
2. Review on 160 credits allotted all over the course and allotment of credits to Professional Core Course (PCC) – 51 credits, Professional Elective Courses (PEC) – 15 credits, Open Elective Courses – 12 credits and Skill Oriented Courses (SC) – 10 credits.
3. HOD - chairman proposed an amendment for syllabus change in 'Semester IV (Second year)' – "Theory of Machines" (PCC - 20A341T) subject and displayed for discussion with two different proposals because this syllabus was prepared in combining 'Kinematic of

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- Machinery' and 'Dynamics of Machinery' subjects became very vast and required suggestions for removing few unimportant topics for the benefit of students.
4. R20_ME Regulations offers B.Tech. Minor Degree from ME branch to other branch students and in this regard displayed the subjects list and syllabus which are going to offer by the ME dept are displayed and discussed for suggestions.
 - a. Suggestions received from external members to keep basic subjects of ME branch such that other branch student get overlook on ME.
 - b. Suggestion by external members that other branches minor subjects offered should be discussed among all branches HODs and should be finalized in benefit of student for gaining knowledge.
 5. R20_ME Regulations offers B.Tech. Honors Degree for ME branch students, displayed 4 different pools with different mechanical streams and proposed to suggest any new subjects or advanced subjects can be offered to ME students.
 - a. Suggestions received from external members that selection of subject from each pool has to be done for each semester not all the subjects from single pool or stream.
 - b. Suggested to make sure that pre-requisite criterion should be satisfied before a student selects an honor subject.

Minutes of Meeting / Action Taken:

1. Approved proposed amendment for syllabus change in 'Semester IV (Second year)' – "Theory of Machines" (PCC - 20A341T) subject and taken action to incorporate the new syllabus in curriculum.
2. Approved proposed four minor subjects and recommended to add subjects 'Basic Thermodynamics & Basic Mechanical Engineering'. Action taken by adding the two new suggested subjects and syllabus in to list of 6 subjects for minor degree in ME.
3. Information is passed to the principal about discussing and sharing of minor subjects among all the branches and finalizing the list, for the benefit of student knowledge as suggested by external BOS members.
4. Approved proposed subjects for honors degree with four pools and one subject from each pool has to be selected in each semester by student. Action taken by changing a few pre-requisites of the honor subjects and the same is incorporated in the curriculum with syllabus.


HOD

Encl:

1. Attendance of BOS Meeting
2. Google drive links of meeting videos
 - <https://drive.google.com/file/d/1VAKAc6FRELnlknNr9zSTIAgg81onB7jM/view?usp=sharing>
3. Approved list of Minor and Honors Subjects of ME Dept.
4. Approved new syllabus of 'Theory of Machines'.

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Attendance Details of External and Internal BoS members for meeting on 16/05/2022 (online)

Sl. No.	Name of the Member	Designation	Signature
1	Dr.A.Hemantha kumar, Professor & Head, Dept. of Mechanical Engineering, AITS, Rajampet ahkairs@gmail.com 9533344405	Chair Person	Attended Online
External Experts			
2	Dr. G. Jaya Chandra Reddy Professor and Head, Mechanical Engineering Dept., Y.S.R Engineering College of Yogi Vemana University, Proddatur - 516 360. YSR (Dist) A.P Cell No: 9441210045. jcr.yvuce@gmail.com	Academic Experts	Attended Online
3	Dr. N. Venkaiah Assoc. Professor of Mechanical Engineering Dean of Students Affairs Indian Institute of Technology Tirupati Tirupati – Renigunta Road, Settipalli Post – 517 506, Chittoor District, A.P. Phone: 0877-2503035 (Office) 09441933382 (Mobile). venkaiah@iittp.ac.in	Academic Experts	Attended Online
4	Dr. M. Ravi Sankar Associate Professor, Department of Mechanical Engineering IIT, Tirupati evmrs@iittp.ac.in , ravisankarm@gmail.com 8638393843	University Nominee	Attended Online
5	Mr. P. Balasankar Automotive Engineer Chennai pbalasankar@gmail.com 9500188656	Industry expert	Attended Online
6	Mr. S Brahmananda Reddy Manager, Vizag Steels Vishakapatnam brahmanrs@gmail.com 8330930942	Meritorious Alumni	Absent
Internal Experts			
7	Dr. P. V. Sanjeev Kumar Associate Professor, Dept. of Mechanical Engineering, AITS, Rajampet. aits.med.pvsk@gmail.com 9441543936	Design Stream Member	Attended Online

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8	Dr. B. Venkatesh Associate Professor, Dept. of Mechanical Engineering, AITS, Rajampet. aits.me.bv@gmail.com 9949193289	Thermal Stream Member	Attended Online
9	Mr. G.Suresh Babu, Assistant Professor, Dept. of Mechanical Engineering, AITS, Rajampet. aits.med.gsb@gmail.com 9949224453	Production Stream Member	Attended Online



(Dr. A. Hemantha Kumar)
HOD & Chair Person

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DEPARTMENT OF MECHANICAL ENGINEERING

R20 - List of Subjects for B.Tech (Minor) In Mechanical Engineering

Sl. No.	Name of the Course	L-T-P	Credits	Pre-Requisite	Offered to
1	Basic Engineering Mechanics	3-1-0	4	NIL	Any Other Branch Students
2	Basic Manufacturing Processes	4-0-0	4	NIL	
3	Basic Engineering Thermodynamics	3-1-0	4	NIL	
4	Total Quality Management	4-0-0	4	NIL	
5	Robotics	4-0-0	4	Basic Engineering Mechanics	
6	Mechatronics	4-0-0	4	NIL	

NOTE: First three subjects are mandatory.

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R20 - List of Subjects for B.Tech (Honors) In Mechanical Engineering

Pool 1: Design Stream					
Sl. No.	Name of the Course	L-T-P	Credits	Pre-Requisite	Offered to
1	Composite Materials	4-0-0	4	Mechanics of Solids	ME Branch Students
2	Design of Hydraulic and Pneumatic Systems	4-0-0	4	Fluid Mechanics & Hydraulic Machines	
3	Materials Characterization Techniques	4-0-0	4	Material Science	
4	Surface Engineering	4-0-0	4	Manufacturing Processes	

Pool 2: Thermal Stream					
Sl. No.	Name of the Course	L-T-P	Credits	Pre-Requisite	Offered to
1	Heating Ventilation & Air Conditioning	4-0-0	4	Basic Thermodynamics	ME Branch Students
2	Combustion, Emissions and Environment	4-0-0	4	IC Engines	
3	Electric and Hybrid Vehicles	4-0-0	4	IC Engines	
4	Alternative Fuels Technologies	4-0-0	4	IC Engines	

Pool 3: Production/Industrial Stream					
Sl. No.	Name of the Course	L-T-P	Credits	Pre-Requisite	Offered to
1	Theory of Control Systems	4-0-0	4	Instrumentation & Control Systems	ME Branch Students
2	Management Information System	4-0-0	4	NIL	
3	Inspection And Quality Control in Manufacturing	4-0-0	4	NIL	
4	Advanced Optimization Techniques	4-0-0	4	NIL	

Pool 4: CAD/CAM Stream					
Sl. No.	Name of the Course	L-T-P	Credits	Pre-Requisite	Offered to
1	Soft Computing Techniques	4-0-0	4	CAD/CAM	ME Branch Students
2	Computer Numerical Control	4-0-0	4	CAD/CAM	
3	Flexible Manufacturing System	4-0-0	4	Automation & Robotics	
4	Computer Integrated Manufacturing	4-0-0	4	CAD/CAM	

Note: One subject has to be selected from each pool in every semester.

L.C.D/Red

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of Mechanical Engineering

Title of the Course Theory of Machines
Category PCC
Course Code 20A341T

Year II B, Tech
Semester II Semester
Branch ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enable the students in selection of appropriate mechanisms.
- To analyze the straight line motion mechanisms, steering mechanisms.
- To know the importance of gyroscope and its effects in an aeroplane & ship.
- To understand the kinematics of mechanisms and gears.
- To understand the balancing of rotating masses and reciprocating masses
- To understand the concept of vibratory systems and their analysis

Unit 1 Simple Mechanisms, Lower Pair Mechanisms 12

Simple Mechanisms: Element or Link - Classification - Kinematic pair - Types - Constrained motion - types - Degree of freedom - Grashof's law, kinematic inversions of four bar chain, single and double slider crank chains.

Lower Pair Mechanisms: Pantograph - Peaucollier mechanism - Steering gear mechanism: Ackermann, Davis.

- Learning Outcomes:** At the end of the unit, the student will be able to:
- Contrast the difference between machine and structure. (L4)
 - Identify different types of kinematic pairs, kinematic chains, find degrees of freedom for different mechanisms, and identify the inversions of four bar mechanism (L2)

Unit 2 Velocity & Acceleration Analysis and Gyroscope 12

Velocity Analysis: Relative velocity method- Motion of Link - construction of velocity diagrams - determination of angular velocity of points and links - four bar chain, single slider crank chain and other simple mechanisms.

Acceleration Analysis: Acceleration diagram for simple mechanisms - four bar mechanism and single slider crank chain mechanism - determination of acceleration of points and angular acceleration of links. Coriolis component of acceleration.

Gyroscope: Principle of gyroscope, gyroscopic effect in an aeroplane, Ships.

- Learning Outcomes:** At the end of the unit, the student will be able to:
- calculate the velocities and acceleration of various links in a mechanism (L3)
 - determine instantaneous centers for a given mechanism (L3)
 - apply gyroscopic concept to various moving vehicles (L3)

Unit 3 Gears and Gear trains 14

Gears and Gear trains: Friction wheels and toothed gears - types - law of gearing - condition for constant velocity ratio for transmission of motion - forms of teeth - Cycloidal and involute profiles - velocity of sliding, path of contact, arc of contact and contact ratio - phenomena of interference -Types of gear trains-simple, compound, reverted, and epicyclic-kinematics- simple problems.

- Learning Outcomes:** At the end of the unit, the student will be able to:
- explain the different gear profiles and parameters (L2)
 - identify different types of gear trains (L2)

Unit 4 Balancing of masses 10

Balancing of Rotating: Need for balancing, balancing of single mass and several masses in different planes-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.

- Learning Outcomes:** At the end of the unit, the student will be able to:
- explain the importance of balancing and analyze balancing problems in rotating engines and reciprocating engines. (L4)

Unit 5 Vibrations 18

Introduction, types of vibration - natural frequency of undamped longitudinal vibrations. Transverse vibrations - simple systems (Cantilever and Simply supported beams)- Dunkerly's method, Whirling of shafts or Critical speed of Horizontal shafts. Torsional vibrations - Single rotor, and Two-rotor system.

- Learning Outcomes:** At the end of the unit, the student will be able to:
- Estimate natural frequency of vibratory systems (L5)
 - Calculate torsional vibrations of single and two rotor systems. (L3)

Prescribed Text Books:

- S.S.Rattan, Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014
- R.S.Khurmi&J.K.Gupta, Theory of Machines, S. Chand Publications.

Reference Books:

- J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014
- P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers, Delhi, 2003.
- Thomas Bevan, Theory of Machines, 3rd edition, CBS Publishers & Distributors, 2005
- JagdishLal, Theory of Mechanisms and Machines, Metropolitan company pvt. Ltd.
- R.K.Bansal, Theory of Machines, Lakshmi Publications.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand different mechanisms and their inversions and straight line motion mechanisms and steering mechanisms.	L4
2. Calculate velocity and acceleration of different links in a mechanism and apply the effects of gyroscopic couple in ships and aero planes.	L3
3. Analyze gear system for a mechanism or machine.	L3
4. Evaluate unbalanced masses in rotating machines and reciprocating machines.	L4
5. Analyze natural frequency of vibratory system and torsional vibrations for single and two rotor systems.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A341T.1	3	2	1	-	-	-	-	-	1	-	1	-	-	-	-
20A341T.2	3	2	2	-	-	-	-	-	2	-	1	-	-	-	-
20A341T.3	3	2	2	-	-	-	-	-	2	-	1	-	-	-	-
20A341T.4	3	2	1	-	-	-	-	-	1	-	1	-	-	-	-
20A341T.5	3	2	2	-	-	-	-	-	2	-	1	-	-	-	-

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