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XXVII Academic Council – Annexure 3.5
Department of Mechanical Engineering
Minutes of the 16th BOS meeting

The Department BOS meeting held on 6th June, 2019 from 10:00 AM onwards in Room No.M118

The following Members were present:

1. Dr. A. Srinath, Head of the Dept., and Professor ME – Chairman
2. Dr.A. Jagadeesh, Professor, CCO & Director FED
3. Dr. B. Nageswara Rao, Chairman RPAC ME and Professor ME
4. Dr. K. Rama Krishna, Dean - Quality and Professor ME,
5. Dr. Rajesh kumar Bhuyan, professor, Group Head- Design & Manufacturing
6. Dr. P. Issac Prasad, Professor ME, Group Head- Energy & CFD
7. Dr. Y. Kalyan Chakravarthy, Associate Professor ME, Group Head- Robotics & Mechatronics
8. Dr. G. Diwakar, Professor ME
9. Dr.D.V.A.Rama Sastry, Associate professor, Deputy HOD-ME
10. Dr.T.Vijaya Kumar, Associate professor, Deputy HOD-ME
11. Dr. P.V.Chalapathi, Associate Dean-Practise school
12. Dr. K.V. Narasimha Rao, Professor-ME
13. Dr. D. Kiran Kumar, Associate Professor ME
14. Dr. G. Yedukondalu, Group Head, Associate Professor-ME
15. Dr.M.B.S.Sreekar Reddy, Associate Professor ME
16. Dr.P.Kasi V Rao, Assistant Professor ME
17. Mr. P. Ratna Prasad, Assistant Professor ME
18. Dr.B.Loveswara Rao, Professor, Co-opted Member
19. Dr.A.Venu Gopal, Professor, NIT Warangal
20. Dr. R. Vijaya Kumar, Senior Manager, R & D HAL Bangalore
21. Dr. P. Srinivasa Rao, Global Training Head, Cyient Technologies, Hyderabad
22. Dr.K.Ravi Teja, Manager, Hyundai R & D Division, Hyderabad
23. Mr.S.Narayana Murthy, III year Student
24. Mr. Shubham Mahindra, III year Students
25. Mr. K. Jayavanth, II year Student

The following members were absent.

1. Dr. Gnanamurthy, Professor, Dept. of ME, IIT-Madras

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AGENDA and RESOLUTIONS

AGENDA ITEM-1

DAC meeting minutes	Resolution Passed
To consider and approve the resolutions of Department Academic Committee (DAC) meeting held on 24-04-2019.	It is resolved to approve all the resolutions of Department Academic Committee (DAC) meeting held on 24-04-2019, and the same is recommended to Academics Council for approval **(Annexure-1)**.

AGENDA ITEM-2

Stake Holders Feedback	Resolution Passed
To Consider the feedback of Stake Holders on the Curriculum of 2019-20 admitted batch. And to revise the courses to be offered to 2019-20 admitted batch students.	It is resolved to approve the feedback given by stake holders and to approve the revisions proposed on the curriculum and syllabus of 2019-20 admitted batch. The same is recommended to Academic Council for approval.

- Upon discussing the feedback given by Y15 students to have better understanding of the subjects, it is resolved to educate the students about the importance of self-learning and addressed all the members about the Blended Learning concept introduced in 2019-20 odd semester courses, where in for a course with 45 periods of theory classes: 15 periods are allotted for regular teaching by course instructor, 15 periods for self-learning through MOOCs, 15 periods for Peer Learning.

- Upon discussing the feedback given by Y13 students to give more focus on laboratory to gain more knowledge, it is resolved to caution the faculty members to be more effective in conducting practical and skilling sessions.

- Upon discussing the feedback given by MR.M B.S.Sreekar Reddy faculty member, to add topics on family business and marketing in Entrepreneurship course, It is resolved to approve the suggested topics to be included in "Entrepreneurship" course for 2019-20 admitted batch students.

- Upon discussing the feedback given by Dr. B.Nageswara Rao faculty member, to add topics on Baye's theorem, Gauss theorem, Structure of Algebra-Semigroups in Mathematics for Engineers course, it is resolved to approve the suggested topics to be included in "Mathematics of Engineers" course for 2019-20 admitted batch students .

- Upon discussing the feedback given by Mr.S.Ramesh Kumar to add topics on Python programming, 2D & 3D Plotting in Computational Thinking and Data Science course and

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topics on sorting in Data Structures course, it is resolved and approved the topics suggested to be included in "Computational Thinking and Data Sciences" and "Data Structures" course for 2019-20 admitted batch.

- Based on the feedback of Dr.P Kasi V Rao, faculty member to revise Mechanics of Solids-II course by adding topics on Design Philosophy, Codes & standards, it is resolved to approve the suggested topics to be included in "Mechanics of Solids-II" course for 2019-20 admitted batch students.

- Based on the feedback given by Mr.T.Vijaya Kumar Faculty member, to include metrology topic in Measurements and Instrumentation course, it is resolved to include the suggested topic and rename the above said course as "Metrology and Measurements" for 2019-20 admitted batch students.

- Based on the discussion with BOS members it is resolved to offer Metrology and Measurements (19ME2106) course in fifth semester and Materials for Mechanical Engineering Applications(19PH2007) course in third semester for 2019-20 admitted batch students.

- Based on the feedback given by Mr.Khadar Basha Abdul, Manager Rolls Royce, to include Geometric Dimensioning and Tolerancing, it is resolved and approve to deliver the said content for Y16 students during CRT classes and for Y17, Y18 and Y19 batch students in "Machine drawing" and Design for Manufacturing Courses

- Upon discussing the feedback of Industry person Dr.P.Srinivasa Rao, to add topics on flow and non-flow processes, work study in flow processes and applications of Steady flow energy equation in Thermal fluids Engineering-I and Shape factor concepts in Heat Transfer Course, it is resolved and approved to incorporate the topics suggested in "Thermal Fluids Engineering-I" and "Heat Transfer" Courses.

- Based on the feedback of Alumni, Dr.R.Vijay Kumar, to include concepts of Artificial intelligence in Robotics course as it is the emerging field, it is resolved to approve and incorporate the suggested topic in Robotics course and name it as "Robotics and Artificial Intelligence".

Proposed to revise the syllabus of Y18 courses based on the feedback received from stake holders.

S.No.	Course Code	Course Title	Course Type	Percentage of revision	Remarks
2	19ME2102	Mathematics for Engineers	Basic Sciences	50	As per the feedback from faculty to make students

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					understand the latest concepts the topics suggested are included
3	19SC1202	Data Structures	Engineering Sciences	25	As per the recommendation of Faculty the suggested topics are included, so that the flow of content will be appropriate
8	19ME2106	Metrology & Measurements	Core	50	As per the recommendations of faculty the topics on metrology are included in measurements and instrumentation course and the name of the course is changed to Metrology and measurements.
10	19ME3116	Robotics & Artificial Intelligence	Core	50	As per the recommendation of industry expert topics related to artificial intelligence are included in the course and is introduced to 2019-20 admitted batch students in place of Robotics and Control

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The detailed stakeholders feedback and action taken report is given in **Annexure-2(a)**. The detailed syllabus revision proposed for 2019-20 admitted batch students is given in **Annexure-2 (b).**

AGENDA ITEM-3

Courses introduced for 2019-20 Admitted batch (B.Tech)	Resolution Passed: It is resolved to approve the curriculum, courses introduced for 2019-20 Admitted batch (B.Tech) and the same is recommended to Academic Council for approval.

- Dr. P Srinivas Rao-BOS external member recommended to offer a course which can bridge the gap in the English language between campus and corporate field. It is resolved and approved to offer "Campus to Corporate" course to 2019-20 admitted batch students.

- Dr.A.Venu Gopal-BOS external member suggested to offer a course which covers the topics related to Mathematics in Computing. It is resolved to offer "Mathematics for Computing" course to 2019-20 admitted batch students.

- Academic Peer-Dr.Akthar Khan, recommended to include courses covering different software tools like Fusion 360, 3D printing, Latex etc., used in Engineering during the I year, so that students will be able to use them in their further semester in the relevant courses. It is resolved and approved to offer new courses "Design Tools Workshop-I" and "Design Tools Workshop-II" in the I year covering the basics of various software tools.

- Dr.R.Vijay Kumar-BOS External member, recommended to include skilling courses in Manufacturing technology and Control systems used in Machines. It is resolved and approved to offer two new skilling courses "Skilling for Engineers-I(Manufacturing Technologies)" and "Skilling for Engineers-II (Control Systems for Machines)" for 2019-20 admitted batch students.

- Dr.Issac Prasad (Internal member)-Thermal group Head, suggested to offer a course on Automobile Design using software in order to make students ready with the industry needs in automobile field. He also suggested to include course which deals with the practical approach of engineering principles in the physical world. It is resolved and approved to introduce "Technical Proficiency & Training -1 (Automobile Design and Building)" as skilling course and "Engineering in Physical World" as core course to 2019-20 admitted batch students.

- Dr. Y.Kalyan Chakravarthy(Internal member)-Robotics group head, recommended to offer technical proficiency course on Robot Design, so that students will be acquainted with the latest technologies in Robotics. It is resolved and approved to offer "Technical Proficiency & Training-2 (Robot Design)" as skilling course to 2019-20 admitted batch students.

- Internal member and Robotics group head Dr. Y. Kalyan Chakravarthy suggested to include courses on Machine learning and internet of Things as these are very much needed concepts

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in the present industry. It is resolved and approved to offer new courses "Machine learning" and "Internet of things" as Flexi core courses for 2019-20 admitted batch students.

- Academic peer-Dr. Ashok Kumar, suggested to offer a course relevant to the concept of product design as it helps students to gain knowledge in the field of Design and Manufacturing. It is resolved and approved to Introduce a new Specialization "Product Design" with the following course to 2019-20 admitted batch students.
  i. Design For Quality and Reliability
  ii. Designing Intelligence Systems
  iii. Sustainable Design
  iv. Systems Thinking for Design
  v. Design with Advanced Engineering Materials
  vi. Design for Manufacture and Assembly

Courses Introduced for 2019-20 admitted batch based on the feedback of stake holders.

S.No.	Course Code	Course Title	Course Type	Remarks
2	19MT1101	Mathematics for Computing	Basic Sciences	As per the recommendations of BOS members a new course is introduced in place of Foundations of Computational Mathematics course
3	19ME1103	Design Tools Workshop-I	Engineering Sciences	As per the recommendation of Academic Peers to impart knowledge on various soft tools this course is introduced
4	19ME1209	Design Tools Workshop-II	Engineering Sciences	As per the recommendation of Academic Peers to impart knowledge on various soft tools this course is introduced
11	19ME3220	Machine learning	Flexi Core	Based on the suggestion of faculty to make students ready with the emerging technologies this course is introduced
12	19ME4201	Design for Quality and Reliability	Professional Elective	Based on the recommendations of Academic Peer this course is introduced under Product Design and Development specialization
13	19ME4202	Designing Intelligence Systems	Professional Elective	Based on the recommendations of Academic Peer this course is

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				introduced under Product Design and Development specialization
14	19ME4203	Sustainable Design	Professional Elective	Based on the recommendations of Academic Peer this course is introduced under Product Design and Development specialization
15	19ME4204	Systems Design for Thinking	Professional Elective	Based on the recommendations of Academic Peer this course is introduced under Product Design and Development specialization
16	19ME4205	Design with Advanced Engineering Materials	Professional Elective	Based on the recommendations of Academic Peer this course is introduced under Product Design and Development specialization
17	19ME4206	Design for Manufacture and Assembly	Professional Elective	Based on the recommendations of Academic Peer this course is introduced under Product Design and Development specialization

The Curriculum Structure of 2019-20 is given in **Annexure-3(a)** and syllabus for new courses is given in **Annexure-3(b)**.

AGENDA ITEM-4

Minor Syllabus revisions proposed by Course coordinators in syllabus/Course outcomes/experiments/teaching pedagogies of 2019-20 Odd Sem courses	Resolution Passed: It is resolved to approve the minor syllabus revisions proposed by the course coordinators of 2019-20 odd Sem courses and recommend the same to Academic Council or approval. **(Annexure-4)**

Course coordinators of 2019-20 odd sem proposed minor revisions in the following courses.

a) Finite Element Analysis of Solids & Fluids (17ME3117)
b) Design and Manufacturing – I (17ME3114 & 18ME2211)
c) Computational Thinking & Data Sciences (17ME2005)
d) Skilling for Engineers-3 (Problem Solving Techniques in Thermal) (17TS703)
e) Machine Drawing (18ME2110)
f) Skilling for Engineers-4 (Problem Solving Techniques in Design) (18TS704)
g) Measurements & Instrumentation (18ME2106)
h) Automotive Transmission (16ME4073)
i) Modern Manufacturing Process (16ME4160)
j) Automobile Engineering (16ME4071)

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AGENDA ITEM-5

To consider and approve the Open book Exam for the list of courses in 2019-20 odd Sem	Resolution Passed: It is resolved to approve the open book exam for the list of courses in 2019-20 odd Sem and the same is recommended to Academic Council for approval

To enable open ended learning and make students attain "critical thinking & complex problem solving" skills, it is required to conduct open book examination for the courses in which the scope of giving open ended questions is possible. It is resolved to approve conduction of Open Book Examination for the following courses of A.Y. 2019-20 odd semester.

- Mechanics of Materials – II (18ME2108)
- Design and Manufacturing-I (18ME2211)
- Introduction to Robotics (17ME3118)
- Finite Element Analysis of Solids & Fluids (17ME3117)
- Design of Transmission Elements (16ME4125)

AGENDA ITEM-6

Other Points-1: Rules & Modalities for students opting for 1 year internship in their final year	Resolution Passed: It is resolved to approve the rules and modalities for students opting 1 year internship in their final year and recommend the same to Academic council for approval

For the students opting for 1 year Internship during their final year of study, the following rules/flexibilities shall be given:

- The mandatory rule of Publication in Scopus indexed journal will be relaxed in lieu of this their field work will be evaluated.
- The theory courses offered in final year may be opted to complete in online mode by registering in approved MOOCs.
- Such students can opt for available academic flexibility like "acceleration" by overloading themselves during their third year of study or during summer break.
- For the courses with laboratory component offered in final year, student can use virtual Labs for the applicable courses.

AGENDA ITEM-7

Value Added/ Certification Courses	Resolution Passed: It is resolved to the value added courses to Y19 admitted batch students and the same is recommended to Academic Council for approval (Annexure-8)

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AGENDA ITEM-8

CO-PO Attainment	Resolution Passed: It is resolved to approve the CO-PO attainment of previous semester and the same is recommended to Academic Council for approval

AGENDA ITEM-9

Other Points-2: Placement and R&D related data	Resolution Passed: It is resolved to approve the Placement and R&D related data of 2018-19 A.Y. and recommend the same to Academic Council for approval

With the permission of the BOS Chairman, the Prof. I/C placements, Dr.M.B.S.Sreekar Reddy and Prof. I/C R&D presented the Placements data and R&D data of the Mechanical department for the A.Y 2018-19 to all the members of BOS.

AGENDA ITEM-10

Other Points-3: Activities/Modalities to be implemented at university level to run the departments effectively without any lapses.	Resolution Passed: It is resolved to recommend theses points for the discussion and approval in forth coming Academic Council

- The detention and promotion of students during the semester shall be the prerogative of the department.
- Attendance and marks of all students shall be submitted to concern HODs on fortnight basis to communicate the same to parents, monitor the progress and counsel the students continuously.
- As and when the End Semester Results were declared, concern HODs shall be given the access to view the results of all the students.

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6/6/2019

(Dr. A. Srinath)
Chairman – BoS
Dept. of ME

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Annexure-1

K L E F

DEPARTMENT OF MECHANICAL ENGINEERING

MINUTES OF DEPARTMENT ACADEMIC COMMITTEE (DAC)

The Department Academic Committee (DAC) Meeting was conducted at 10:30 A.M. on 24/04/2019 in the HoD Chamber, with HoD in the chair.

Agenda of the Meeting:

1. To discuss the feedback received from all stake holders.
2. To discuss and recommend Curriculum for 2019-20 admitted batch of B.Tech.
3. To discuss and recommend the changes proposed in curriculum of 2018-19 admitted batch of B.Tech.
4. To discuss and recommend the revisions proposed in syllabus/experiments/teaching pedagogies for the courses to be offered in 2019-20 odd semester, if any.
5. Any other points with the permission of chair.

The following Members were present:

Faculty	Students
Dr. A. Srinath, Professor, Head of the Dept.	Mr. P. Vamsi Ram Chaitanya (182072005), I/II M.Tech-Robo & Mechatronics
Mr. D. V. A. Ramasastry, Associate Professor, Deputy HOD	Ms. M. Sankeerthana (182071015), I/II M.Tech-Thermal
Mr. T. Vijay Kumar, Associate Professor, Deputy HOD	Mr. R. kiran Kumar Reddy (182073001), I/II M.Tech-Machine Design
Dr.Y.Kalyan Chakravarthy, Associate Professor, Group Head-Robotics & Mechatronics	Mr. A. Mani Krishna (150070033), IV/IV B.Tech
Dr. P. Issac Prasad, Professor, Group Head-Energy & CFD	Mr. G. Raj Kumar (150070111), IV/IV B.Tech
Dr. S. S. Rao, Professor, PG Coordinator	Mr. K. taraka Sri Ram (150070177), IV/IV B.Tech
Dr. B. Nageswara Rao, Professor, RPAC Chairman	Mr. A. Dharmendra (160070004), III/IV B.Tech
Dr. G. Diwakar, Professor, RPAC Chairman	Mr. S. Narayana Murthy (160070331), III/IV B.Tech
Dr. K. V. Ramana, Professor	Mr. Shubham Mohindru (160070392), III/IV B.Tech
Dr. K. V. Narasimha Rao, Professor	Mr. S. Sai (160070404), III/IV B.Tech
Dr. M. Nageswara Rao, Associate Professor, Y16 Batch Coordinator	Mr. R. Jugal Kishore (160070398), III/IV B.Tech

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Mr. G. Sanjay Krishna, Associate Professor, Y18 Batch Coordinator	Mr. A. Hema Sai (170070008), II/IV B.Tech
Mr. K. M. V. Ravi Teja, Assistant Professor, Y17 Batch Coordinator	Mr. K. Jeyavanth (170070097), II/IV B.Tech
Dr. M. B. S. Sreekar Reddy, Associate Professor, Prof. I/C Placements	Mr. P. Lokesh (170070152), II/IV B.Tech
Mr. P. Kasi V Rao, Asst. Professor, Prof. I/C Academics	
Mr. P. Ratna Prasad, Asst. Professor, Prof. I/C Quality	

The following points were discussed, deliberated:

Agenda Item 1:

To discuss the feedback received from all stake holders

Resolutions: It is resolved to consider the suggestion given by stake holders and put forth on upcoming BOS for further approval

Agenda Item 2:

To discuss and recommend the Course Structure for 2019-20 admitted batch of B.Tech.

Resolution:

The detailed course structure semester wise was discussed in detail with all the members and finalized the curriculum for 2019-20 admitted batch of B.Tech

Agenda Item 3:

To discuss and recommend the changes proposed in curriculum of 2018-19 admitted batch of B.Tech.

Resolution:

The modifications suggested were considered and resolved to incorporate in curriculum of 2018-19 admitted batch

Agenda Item 4:

To discuss and recommend the revisions proposed in syllabus/COs/experiments/teaching pedagogies for the courses to be offered in **2019-20 odd semester**.

Resolution:

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It is resolved to approve the revisions proposed by the course coordinators for the courses offered in 2019-20 odd semester

Other Item-1:

To propose the modalities in Project for the students opting for 1 year Internship during their final year of study.

Resolution:

Students opting for 1 year Internship during IV year have to impart the skills gained in internship to their CRT registered juniors through series of seminars. As, this sort of skill transfer sessions will exhibit the skill acquired by such students and also will benefit the students seeking placement opportunity, this activity may be considered as equivalence to project part-I or project part-II with same credits.

Other Item-2:

To offer the training classes on latest software for CRT students during CRT Training.

Resolution:

It is resolved to offer hands-on training program on FUSION 360 and CATIA for CRT students by APSSDC during their CRT classes conducted in summer break to make them ready for the Companies seeking these skills.

Other Item-3:

To recommend the changes proposed in L-T-P-S structures of skilling courses offered for 2017-18 and 2018-19 admitted batches.

Resolution:

It is resolved to revise the L-T-P-S structures for the skilling courses offered for 2017-18 and 2018-19 admitted batches to overcome the operational difficulties like excess contact hours per week in a semester.

Other Item-4:

To recommend and propose the list of open electives for 2016-17 admitted batch.

Resolution:

It is resolved to offer/continue the same open electives which are being offered for 2015-16 admitted batch to 2016-17 admitted batch also.

Chairman-DAC
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Annexure-2(a)

Report- Analysis of Feedback on curriculum – received from the stake holders prior to the commencement of the Academic Year 2019-20

Feedback from different stake holders has been collected in respect of the curriculum offered for the academic year 2018-19

S. No.	Type of Stake holder	Number of feedbacks
1	Students	45
2	Parents	0
3	Alumni	1
4	Faculty	12
5	Academic peers	1
6	Industry persons	4
	Total	61

S. No.	Recommendations	Action taken in DAC (24/04/2019)	Action taken in BOS (08/06/2019)
Students Feedback			
1	Y 15 Batch Students requested to include more number of lecture slots to have better understanding of the subject.	It is resolved to educate the students about the importance of self-learning and addressed all the members about the Blended Learning concept introduced in 2019-20 odd semester courses, where in for a course with 45 periods of theory classes: 15 periods are allotted for regular teaching by course instructor, 15 periods for self-learning through MOOCs, 15 periods for Peer Learning.	It is resolved to approve the self-learning concept through MOOC's platform
2	Y16 Batch Students requested to give more focus to laboratory to gain more practical knowledge	It is resolved to caution the faculty members to be more effective in conducting practical sessions and skilling courses.	It is resolved to consider the request of students and caution the faculty to be more cautious
Faculty Feedback			
3	Mr.M.B.S.Sreekar Reddy requested to include topics on family business, marketing in Entrepreneurship course as these topics will help students in understanding the various types of businesses • **Metrology & Measurements**	It is resolved to include the topics on Family business, Starting new business, buying an existing business	It is resolved to approve the new topics to be included in Entrepreneurship course
	Dr.B.N.Rao, Professor, suggested to add topics on probability addition, multiplication, Baye's theorem, Gauss theorem, Markov process., Structure of Algebra-Semigroups, Monoids and Groups. Homomorphism's, Normal subgroups and congruence Relations, Rings in Mathematics for Engineers course to prepare students ready for the most advanced concepts	It is resolved to include the topics on probability addition, multiplication, Baye's theorem, Gauss theorem, Markov process., Structure of Algebra- Semigroups, Monoids and Groups, Homomorphism's, Normal subgroups and congruence Relations, Rings in Mathematics for Engineers Course	It is resolved to approve the new topics to be included in Mathematics for Engineers course
	Mr.S.Ramesh Kumar suggested to add topics on Python, Data Manipulation using Python, Data Analysis with 2D Plotting, Data Analysis with 3D Plotting. In the course Computational Thinking and Data Sciences to impart knowledge on the emerging Python language to students	It is resolved to include the topics on Introduction to python Data Manipulation using Python, Data Analysis with 2D Plotting, Data Analysis with 3D Plotting. In the course Computational Thinking and Data Sciences,	It is resolved to approve the suggested topics in the Computational Thinking and Data Sciences
	Mr.Kasi V Rao, Faculty, suggested to include topics on Identification and Problem Definition, Concept Generation and Evaluation, Embodiment Design,	It is resolved to include the topics on Introduction to include suggested topics in Mechanics of Materials-II course	It is resolved to approve the suggested topics to

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	Design Philosophy, General considerations and procedure in machine design, preferred numbers, Codes & Standards in Mechanics of solids-II Course, to make student understand the standards and procedures followed in mechanical design		be included in Mechanics of Solids-II course
	Mr.T.Vijaya Kumar, Faculty, suggested to include topics on metrology to enable students understand the working of various measuring instruments	It is resolved to include the topics on metrology in Measurements and Instrumentation course and rename the course as Metrology and measurements	It is resolved to approve the topics suggested and to change the name of the course
Academic peers and Industry Persons Feedback			
6	Mr. Khadar Basha Abdul, Rolls-Royce suggested to include Geometrical Dimensioning & Tolerancing Course	It is resolved to deliver the content of course entitled "**Geometric Dimensioning and Tolerancing**" for Y16 students during CRT classes and for Y17, Y18 and Y19 batch students in Machine drawing and Design for Manufacturing Courses.	Approved
7	Mr. Agni Mitra, Junior Engineer, NAL Bangalore suggested to include design project in every course which involve hand calculations, parametric study, selection of parameters etc. also suggested to include Production Drawing and Computer aided drafting in machine drawing course to enable students industry ready.	It is resolved to include and effectively implement the project based lab concept for the applicable courses. It is resolved to include production drawing and computer aided drafting topics in Machine drawing course.	Approved to include the suggested topics in Machine Drawing course
8	Dr. R. Vijay Kumar, HAL Bangalore gave a suggestion through mail on 17/12/2018 to all BOS members regarding inclusion of Artificial intelligence techniques in solving mechanical engineering applications	It is resolved to include the Artificial Intelligence Concepts in Robotics and Artificial Intelligence course in Y19 curriculum	Approved to include the suggested topics in Robotics and Artificial Intelligence course as per DAC resolution
9	Dr. P. Srinivasa Rao, Global Training Head, Cyient Technologies represented the suggestions given by his colleagues from Cyient through mail to HOD-ME on 06/05/2019 to make sudents understand the real world situations in fluid flow and heat transfer problems. To add the following topics in **Thermal Fluids Engineering-I** course: • Flow and Non-flow process. • Work study during various Non-flow processes. • Steady flow energy equation and its applications. To add the following topics in **Heat Transfer** course: • Shape factor • Problems based on shape factors	It is resolved to include the suggested topics in Thermal Fluids Engineering-I and Heat transfer course	Approved and included the said topics in Thermal Fluids Engineering and Heat Transfer Courses
10	Mr. Srinivasulu Boligarla, Chief Consultant, Engineering and Industrial Services (EIS), Hyderabad who gave training for faculty of Mechanical department on Geometric Dimensioning & Tolerancing course, suggested syllabus to be included for B.Tech students through mail on 25/05/2019.	It is resolved that in Machine Drawing and Design for manufacturing course the topics on Geometric Dimensioning and Tolerancing are included.	Approved and included all the topics in **Machine drawing** course and **Design for Manufacturing** Courses
11	Dr. Akthar Khan, Assitant professor IITDM Kurnool suggested to include the following courses for Y19 admitted batch students • Mathematics for computing • Design tools Workshop	It is resolved to include the suggested courses for Y19 admitted batch students. Design tools workshop course is offered as Design tools workshop I & II	Approved as per DAC resolution
12	Dr. Ashok Kumar,Dewangan, Assitant professor NIT Delhi, suggested to include the following courses under design specialization	It is resolved to include the suggested course for Y19 admitted batch students under design specialization	Approved as per DAC resolution

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	• Design For Quality And Reliability • Designing Intelligence Systems • Sustainable Design • Systems Thinking for Design • Design with Advanced Engineering Materials • Design for Manufacture And Assembly		
13	Mr.K.Shahikanth, Manager, Hyundai Hyderabd division suggested to include skilling course for manufacturing technology & Control Systems. HE also suggested to include Machine learning and Internet of Things as per the industry requirements	It is resolved to include following courses for Y19 admitted batch students • Skilling for Engineers-1 (Manufacturing Technologies) • Skilling for Engineers-2 (Control Systems for Machines) • Internet of Things • Machine Learning	Approved as per DAC resolution

Chairman-DAC

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Annexure-2(b)

1. **Course wise Syllabus revision of approved structure as mentioned in point 1**

Course Code	Course Name	Course Category	Existing Syllabus	New Syllabus	Topics Added/Removed/ Replaced	Change in Outcome	Justification for the Modification	Revision Percentage
19UC0011	Entrepreneurship	HSS	Conceptual definition of entrepreneurs and entrepreneurship, Entrepreneurship in economic theory, Historical development of entrepreneurship, Entrepreneurial practice, The importance of small business, Entrepreneurial economy, Entrepreneurship and Economic Development, Type of Entrepreneurship, Entrepreneur and small business, Features and types of businesses and entrepreneurs, Sources of business ideas, The role of entrepreneurship in economic development, Terms of entrepreneurship, Innovation and entrepreneurship, Entrepreneurship and small business, The life cycle of a small company, Small business sector in Croatia, Forms of entrepreneurial organization, Sources of capital, Entrepreneurial process,	Conceptual definition of entrepreneurs and entrepreneurship, Entrepreneurship in economic theory, Historical development of entrepreneurship, Entrepreneurial practice, The importance of small business, Entrepreneurial economy, Entrepreneurship and Economic Development, Type of Entrepreneurship, Entrepreneur and small business, Features and types of businesses and entrepreneurs, Sources of business ideas, The role of entrepreneurship in economic development, Terms of entrepreneurship, Innovation and entrepreneurship, Entrepreneurship and small business, The life cycle of a small company, Small business sector in Croatia, Forms of entrepreneurial organization, Sources of capital, Entrepreneurial process, Entrepreneurial strategies. Starting a new company, Buying an existing business, Franchising, Family business. Entrepreneurial project: an entrepreneurial venture and entrepreneurial development chain	Topics Added:Entrepreneurial strategies. Starting a new company. Buying an existing business. Franchising. Family business. Entrepreneurial project: an entrepreneurial venture and entrepreneurial development chain	2 outcomes changes	As per the feedback of faculty to give more emphasis on Marketing. family business topics were included	50
19MT2102	Mathematics for Engineers	BS	*(A)* Calculus: (a) Differential and Integral Calculus: Taylor's series for function of two vanables,	(A)Calculus: (a)Differential and Integral Calculus: Taylor's series for function of two variables, Maxima and Minima for	"Topics Added:Probability , Addition. Multiplication and Baye's	2 outcomes changed	As per the feedback from faculty to make students understand the	50

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			Maxima and Minima for functions of two variables, Evaluation of double and triple integrals, Change of order of Integration, Change of Variables, in polar, cylindrical and spherical coordinates. **(b)** Vector Calculus: Scalar and vector point functions, Gradient, Directional Derivative, Divergence and Curl, Evaluation of line integrals , Introduction to Greens and Stoke's theorems and their applications. **(c)** Ordinary Differential Equations: Solution of first order equations and their applications, Newton law of cooling, Growth and Decay, Solution of second and higher order Differential Equations. **(d)** Partial Differential Equations: Formation of PDE, Solution of first order linear equations – Lagrange's method, solution of second order PDE by separation of variables. Laplace's equation in two dimensions. ***(B)*** Introduction to Advanced Matrix Algebra: Decomposition, Complex Matrices ***(C)*** Laplace Transforms: Laplace and Inverse Laplace transforms and their properties. ***(D)*** Fourier Series: Definition, Dirchelt conditions, Fourier series for simple functions. ***(E)*** Complex Variables: Complex functions- Exponential, Logarithmic and Trigonometric	functions of two variables, Evaluation of double and triple integrals, Change of order of Integration, Change of Variables, in polar, cylindrical and spherical coordinates. ((b)Vector Calculus: Scalar and vector point functions, Gradient, Directional Derivative, Divergence and Curl, Evaluation of line integrals , Introduction to Greens and Stoke's theorems and their applications. (c)Ordinary Differential Equations: Solution of first order equations and their applications, Newton law of cooling, Growth and Decay, Solution of second and higher order Differential Equations. (d)Partial Differential Equations: Formation of PDE, Solution of first order linear equations – Lagrange's method, solution of second order PDE by separation of variables. Laplace's equation in two dimensions. (B)Introduction to Advanced Matrix Algebra: Decomposition, Complex Matrices (C)Laplace Transforms: Laplace and Inverse Laplace transforms and their properties. (D)Fourier Series: Definition, Dirchelt conditions, Fourier series for simple functions. (E)Complex Variables: Complex functions- Exponential, Logarithmic and Trigonometric functions, Analytic function, Cauchy - Riemann equations, Introduction to Milne Thomson method . ***(F)*** Probability and Random Variables: Probability , Addition,	theorems. Random variables. Probability Distributions – 2outcomesBinomial. Poisson and Gaussian distributions. Introduction to Markov process.. Introduction to Structure of Algebras. Semigroups. Monoids and Groups. Homomorphism's . Normal subgroups and congruence Relations. Rings"		latest concepts the topics suggested are included	

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			functions, Analytic function, Cauchy - Riemann equations, Introduction to Milne Thomson method .	Multiplication and Baye's theorems. Random variables, Probability Distributions – Binomial, Poisson and Gaussian distributions, Introduction to Markov process. *(G)* Algebraic Structures: Introduction to Structure of Algebras, Semi groups, Monolds and Groups, Homomorphism's, Normal subgroups and congruence Relations, Rings.				
19ME2110	Machine Drawing	**ES**	Need for drawing – Principles of Drawing Title boxes, their size, location and details. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and principle of dimensioning, counter sink, counter bores, spot faces, chamfers, screw threads, tapered features. Types of Machine drawings Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs Types of sections. Limits, Fits and Tolerance Drawing of machine elements and simple parts: Screwed fasteners Bolts and nuts Joints Shaft coupling	Review: Orthographic projection, missing lines, Interpolation of views and sectioning Part and assembly drawing Introduction, assembly drawing of stuffing box, steam engine cross head, air valve, Lathe tailstock, gate valve, screw jack, connecting rods, spark plug, tool post, safety Valves etc. Drawing exercises. Specification of materials: Engineering materials, code designation of steels, copper, and aluminum and its alloys. Limits, tolerances and fits: Introduction, limit systems, tolerance, fits drawing exercises. Surface roughness Introduction, surface roughness, machining symbols, identification of surface roughness drawing exercises. **Production drawing:** Introduction to developing and reading of production drawing of simple machine elements like helical gear, bevel gear, flange, pinion shaft, connecting rod, crank shaft, belt pulley, piston details etc, idea about tool drawing. **Computer aided drawing**	**Topics added:** Production drawing and Computer Aided Drafting	**1 Outcome changed**	As per the feedback from the Industry Person production drawing and computer aided drafting are necessary for mechanical engineers the topics suggested are included	**25**

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			Assembly drawings: introduction, stuffing box, eccentric, screw jack, lathe tail stock. Part drawings: introduction, single tool post, plummer block, i c engine connecting rod	Introduction, input, output devices, introduction to drafting software like Creo/ Solidworks, basic commands and development of simple 2D and 3D drawings.				
19ME1204	Computational Thinking and Data Sciences	ES	**Optimization Problems:** Introduction, analyticalmethod, graphical method and numerical method. **Plotting:** Introduction to Plots, Implementing andusing Plots, Plot optimization problems. **Stochastic Programs:** Stochastic Processes, implementing a Random Process. Independence, A Simulation of Stochastic Program, Output of Simulation, Morals, Approximating Using a Simulation. Simulation Models. **Probability and Statistics:** Sampling error and Standard error. Probability sampling. Means and Standard Deviations. Standard error of the Mean. Assessing the Standard error of the Mean. **Random Walks:** Introduction, Structure of Simulation, simulating a single walk. Simulating multiple walks. **Monte Carlo Simulations:** Introduction to Monte Carlo method. Applications of Monte Carlo method in Engineering. **Modeling Data:** Data Study,	**Introduction to Python and Optimization:** Python Introduction, Installation, Print Function and Strings, Mathwith Python, Variables, While Loop, For Loop, If Statement, If Else, If Else if, Functions, Function Parameters, Function Parameter Defaults, Global and Local Variables, writing to a File, Appending Files, Reading from Files, Classes, Introduction to Optimization Problems. **Data Reading and Manipulation using Python:** Getting User Input, Statistics Module, Module import Syntax, making your own Modules, Lists and Tuples, List Manipulation, Multi-Dimensional Lists, Reading CSV files, Stochastic Programs, Probability and Statistics. **Data Analysis with 2D Plotting:** Matplotlib Introduction, Matplotlib Basics, 2D graphs in Matplotlib, 2D Scatter Plot with Python and Matplotlib, More 2D Scatter-Plotting with custom colors, 2D Bar Charts, Random Walks, Monte Carlo Simulations. **Data Analysis with 3D Plotting:** 3D graphs in Matplotlib,3D Scatter Plot with Python and Matplotlib, More 3D	**Topics added:** Introduction to Python, Data Reading and Manipulation using Python, Data Analysis with 2D Plotting, Data Analysis with 3D Plotting.	**2 outcomes changed**	As per the recommendation of faculty to impart knowledge on Python programming to students the suggested topics are included	**50**

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19ME2107	Thermal-Fluids Engineering-I	PC	Fundamental principles of thermodynamics and fluid mechanics. Law of conservation of energy and momentum with applications. Focus on the applications of the first and second laws of thermodynamics with special emphasis on Entropy generation. Study of Properties of fluids. Hydrostatics. Fluid kinematics and application of Bernoulli equation. Internal and external laminar and turbulent viscous flow analysis and Boundary layer theory.	Fundamental principles of thermodynamics and fluid mechanics. Flow and Non-flow process. Law of conservation of energy and momentum with applications. Work study during various Non-flow processes. Steady flow energy equation and its applications. first and second law of thermodynamics with special emphasis on Entropy generation. Study of properties of fluids. hydrostatics. fluid kinematics and applications of Bernoulli equation. Internal and external laminar and turbulent viscous flow analysis and Boundary layer theory.	**Topics added:** Flow and Non-flow process, Work study during various Non-flow processes, Steady flow energy equation and its applications.	**1 Outcomes Changed**	As per the recommendation of Industry peer the suggested topics are included to make students more aware of real world situations	**25%**
19ME3219	Heat Transfer	PC	Fundamental processes of heat transfer, Fourier's law, Heat conduction processes including thermal resistance. Elementary convection. Heat transfer in boiling and condensation. Thermal radiation. including Stefan-Boltzmann law. Small object in large enclosure. and parallel plates. Basic concepts of heat exchangers.	Fundamental processes of heat transfer. Fourier's law. Heat conduction processes including thermal resistance. lumped capacitance. fins. Elementary convection. including laminar and turbulent boundary layers. internal flow. and natural convection. Heat transfer in boiling and condensation. Thermal radiation. including Stefan-Boltzmann law. Small object in large enclosure. and parallel plates. Basic concepts of heat exchangers. shape factors. problems on shape factors	**Topics added:** Shape factor. Problems based on shape factors	**I outcome changed**	As per the recommendation of Industry peer the suggested topics are included to make students more aware of real world situations	**25%**
19ME2108	Mechanics of Solids - II	PC	Introduces mechanical behavior of engineering materials. and the use of materials in mechanical design. Emphasizes the fundamentals of mechanical behavior of materials. as well as design with materials. Major topics: elasticity. plasticity. limit analysis. fatigue. fracture. and creep. Materials selection.	Need Identification and Problem Definition. Concept Generation and Evaluation, Embodiment Design. Selection of Materials and Shapes Mechanical behavior of engineering materials, Selection of Materials. Selection of Shapes. Fundamentals of mechanical behavior of materials. as well as design with	**Topics added:** Need Identification and Problem Definition, Concept Generation and Evaluation, Embodiment Design,	**2 Outcomes Changed**	Faculty	**50%**

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				materials. Elasticity, plasticity, fatigue, fracture, and creep. Design Philosophy, General considerations and procedure in machine design, preferred numbers, Codes & Standards, Reliability Design for Static Strength: Simple Stresses - Combined stresses - Torsional and Bending stresses - Factor of safety and theories of failure. Design for Fatigue Strength: Stress concentration – Methods of reducing stress concentration factor. Design for fluctuating stresses- Endurance limit. Estimation of Endurance strength – Notch sensitivity– Goodman's line and Soderberg's line, Combined fluctuating stresses	Design Philosophy, General considerations and procedure in machine design, preferred numbers, Codes & Standards			
19ME3116	Robotics and Artificial Intelligence	PC	**Intelligent Robotics:** Automation and Robots. Robot Classification. Robot Specifications. Sensory perception. Robot control and Intelligence. **Direct Kinematics:** Coordinate Frames. Rotations. Homogeneous Coordinates. The arm Equation. (DK analysis of - 2 Axis and 3 Axis Planar robot. Four axis SCARA Robot. Five axis Articulated robot). **Inverse Kinematics:** General Properties of Solutions. Tool Configuration. (IK analysis of - 2 Axis and 3 Axis Planar robot. Four axis SCARA Robot. Five axis Articulated robot). **Workspace Analysis and Trajectory Planning:** Workspace analysis. Work envelope of 4-axis SCARA Robot. Work envelope of 5-axis articulated Robot. Workspace	**Intelligent Robotics:** Automation and Robots. Robot Classification. Robot Specifications. Sensory perception. Robot control and Intelligence. **Direct Kinematics:** Coordinate Frames. Rotations. Homogeneous Coordinates. The arm Equation. (DK analysis of - 2 Axis and 3 Axis Planar robot. Four axis SCARA Robot. Five axis Articulated robot). **Inverse Kinematics:** General Properties of Solutions. Tool Configuration. (IK analysis of - 2 Axis and 3 Axis Planar robot. Four axis SCARA Robot. Five axis Articulated robot). **Workspace Analysis and Trajectory Planning:** Workspace analysis. Work envelope of 4-axis SCARA Robot. Work envelope of 5-axis articulated Robot. Workspace Fixtures. The pick-and-place operation. Continuous-Path Motion. Interpolated Motion. Straight Line Motion **Basic Concepts of Artificial Intelligence:** Intelligence. Problem representation in	Topics Added: Elements of Knowledge Representation: Logic, Production Systems, Semantic Networks, Expert Systems. Task Planning: Task-Level Programming, Uncertainty, Configuration Space, Gross-Motion Planning, Grasp Planning, Fine Motion Planning, Task Planning Problem	**2 outcome changed**	As per the recommendation of industry expert topics related to artificaial intelligence are included in the course to enable students understand the technology on AI	**50%**

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			Fixtures, The pick-and-place operation. Continuous-Path Motion, Interpolated Motion, Straight Line Motion. **Basic Concepts of Artificial Intelligence:** Intelligence, Problem representation in Artificial Intelligence. Problem-solution Techniques used in Artificial Intelligence.	Artificial Intelligence, Problem-solution Techniques used in Artificial Intelligence. Elements of Knowledge Representation: Logic, Production Systems, Semantic Networks, Expert Systems. **Task Planning:** Task-Level Programming. Uncertainty, Configuration Space, Gross-Motion Planning, Grasp Planning, Fine Motion Planning, Task Planning Problem				
19ME2106	Metrology and Measurements	**PC**	**Linear and angular measurement:** Definition of metrology, Linear measuring instruments: Vernier, Micrometer, internal measurement, Slip gauges and classification. Interferometer, optical flats. **Limits and Fits**: Tolerances, and Limit gauges. Gauge Calibration: Gauge repeatability and gauge reproducibility studies. **Comparators:** Mechanical, pneumatic and electrical comparators, applications. **Angular measurements**: Sine bar, optical bevel protractor, angle Decker - Taper measurements. Form measurement: Measurement of screw threads, thread gauges, floating carriage micrometer. Surface finish, straightness, flatness and roundness measurement **Introduction to measurements**, Precision and accuracy, generalized	**Linear and angular measurement:** Definition of metrology, Linear measuring instruments: Vernier, Micrometer, internal measurement, Slip gauges and classification. Interferometer, optical flats. **Limits and Fits**: Tolerances, and Limit gauges. Gauge Calibration: Gauge repeatability and gauge reproducibility studies. **Comparators:** Mechanical, pneumatic and electrical comparators, applications. **Angular measurements**: Sine bar, optical bevel protractor, angle Decker - Taper measurements. Form measurement: Measurement of screw threads, thread gauges, floating carriage micrometer. Surface finish, straightness, flatness and roundness measurement **Introduction to measurements**, Precision and accuracy, generalized configuration and functional descriptions of measuring instruments –	Topics Added: Measurement of Acceleration and Vibration: Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle Stress Strain Measurements: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.	**2 outcomes changed**	As per the recommendations of faculty the topics on metrology are included in measurements and instrumentation course and the name of the course is changed to Metrology and measurements.	**50%**

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			configuration and functional descriptions of measuring instruments – examples. Errors in measurements – sources of error, classification and elimination of error. **Measurement of Displacement**: Theory and construction of various transducers to measure displacement– Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures. **Measurement of Level**: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators. **Measurement of Temperature**: Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers–Temperature Indicator **Measurement of Pressure:** Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges –	examples. Errors in measurements – sources of error, classification and elimination of error. **Measurement of Displacement:** Theory and construction of various transducers to measure displacement– Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures. **Measurement of Level**: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators. **Measurement of Temperature**: Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers–Temperature Indicator **Measurement of Pressure:** Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge **Flow Measurement**: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer(LDA).	Measurement of Force, Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers			

			ionization pressure gauges, Mcleod pressure gauge **Flow Measurement**: Rotameter, magnetic, Ultrasonic, Turbine flow meter. Hot – wire anemometer, Laser Doppler Anemometer(LDA). **Measurement of Speed**: Mechanical Tachometers – Electrical tachometers – Stroboscope, Non-contact type of tachometer	**Measurement of Speed**: Mechanical Tachometers – Electrical tachometers – Stroboscope, Non-contact type of tachometer **Measurement of Acceleration and Vibration**: Different simple Instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle **Stress Strain Measurements**: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes. **Measurement of Force,** Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers.				

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Annexure-3(a)

1. Program structure (with all Courses)containing following categorization-2019-20 Admitted Batch

S.No.	Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/Revised Course/ Retained Course	Stake holders category	Justification for considering Feedback
1	19UC1101	Basic English	HSS	0	0	4	0	2	Nil	Retained	No Changes	
2	19UC1202	English Proficiency	HSS	0	0	4	0	2	Nil	Retained	No Changes	
3	19UC2103	Professional Communication Skills	HSS	0	0	4	0	2	Nil	Retained	No Changes	
4	19UC2204	Aptitude Builder-I	HSS	0	0	4	0	2	Nil	Retained	No Changes	
5	19UC3105	Aptitude Builder-II	HSS	0	0	4	0	2	Nil	Retained	No Changes	
6	19UC3206	Campus to Corporate	HSS	0	0	4	0	2	Nil	New Course	BOS External Members	As per the suggestion given by the BOS external member a new course is drafted to bridge the gap between campus and corporate in English language
7	19UC0007	Indian Heritage and Culture	HSS	2	0	0	0	0	Nil	Retained	No Changes	
8	19UC0008	Indian Constitution	HSS	2	0	0	0	0	Nil	Retained	No Changes	
9	19UC0009	Ecology & Environment	HSS	2	0	0	0	0	Nil	Retained	No Changes	
10	19UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	0	Nil	Retained	No Changes	
11	19UC0011	Entrepreneurship	HSS	2	0	0	0	0	Nil	Revised	Faculty member	As per the feedback received from faculty member, the course is revised by adding new topics to give emphasis on family business

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												and Entrepreneurship
12	19MT1101	Mathematics for Computing	BS	3	1	0	4	5	Nil	New Course	BOS member	As per the suggestion of BOS external member to cover the concepts of mathematical computing a new course is drafted.
13	19MT2102	Mathematics for Engineers	BS	3	0	0	0	3	Nil	Revised	Faculty	As per the feedback of faculty member to add topics on Baye's, Gauss theorem etc., the Course is revised by incorporating new topics
14	19PH1010	Science Elective-1 (Mechanics)	BS	3	1	0	0	4	Nil	Retained	No Changes	-
15	19PH2007	Science Elective-2 (Materials for Mechanical Engineering Applications)	BS	2	0	2	0	3	Nil	Retained	No Changes	-
16	19EE2205	Science Elective-3 (Circuits and Electronics)	BS	3	0	2	0	4	Nil	Retained	No Changes	-
17	19BT1001	Biology for Engineers	BS	2	0	0	0	2	Nil	Retained	No Changes	-
18	19ME1103	Design Tools Workshop - I	ES	0	0	4	0	2	Nil	New Course	Academic Peer	As per the recommendation of academic peer, to introduce courses on latest software tools, new course is drafted
19	19SC1209	Design Tools Workshop - II	ES	0	0	4	0	2	Nil	New Course	Academic Peer	As per the recommendation of academic peer, to introduce courses on latest

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												software tools, new course is drafted
20	19SC1101	Problem Solving and Computer Programming	ES	3	0	2	0	4	Nil	Retained.	No changes	-
21	19SC1202	Data Structures	ES	3	0	2	3	4.75	19SC1101	Revised	Faculty	As per the recommendation of faculty sorting topic is added to the Data structures to incorporate the flow of topics.
22	19ME1201	Mechanics of Solids - I	ES	2	0	2	0	3	19PH1010	Retained	No Changes	-
23	19ME1002	Engineering Graphics for Mechanical Engineers	ES	0	0	0	2	0.5	Nil	Retained	No Changes	-
24	19ME2110	Machine Drawing	ES	0	0	4	0	2	19ME1002	Revised	Industry Person	As per the recommendation of industry person, the course is revised by incorporating topics on Geometric Dimensioning and Tolerancing
25	19ME1204	Computational Thinking and Data Sciences	ES	3	0	2	0	4	19SC1101	**Revised**	Faculty member	As per the feedback of faculty member, the course revised by adding topics on 2D,3D plotting, Python coding
26	19ME2003	Workshop Practices for Mechanical Engineers	ES	0	0	4	0	2	Nil	Retained	No Changes	-
27	19ME2205	Numerical Computation for Mechanical Engineers	ES	2	0	2	0	3	Nil	Retained	No Changes	-
28	19SC1106	Technical Skills - 1 (Coding)	ES	0	0	0	6	1.5	Nil	Retained	No Changes	-
29	19ME2107	Thermal-	Prof.Cor	3	0	2	0	4	Nil	Revised	Industry	As per the

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		Fluids Engineering -I	e								Person	feedback of Industry Person, the course is revised by adding topics on flow and non flow processes, work study in flow processes.
30	19ME2108	Mechanics of Solids - II	ES	3	0	2	0	4	19ME1201	Revised	Faculty	As per the feedback of faculty member, topics on Design Philosophy, Standard & Codes are included
31	19ME2211	Manufacturing Techniques	Prof.Core	3	0	2	0	4	Nil	Retained	No Changes	-
32	19ME2212	Thermal-Fluids Engineering -II	Prof.Core	3	0	2	0	4	19ME2107	Retained	No Changes	-
33	19ME2127	Engineering in Physical World	PC	1	0	0	4	2	20ME2105	New Course	Faculty	As per the feedback of Faculty a new course is drafted to enhance the skill related to design of various thermal systems
34	19ME2109	Kinematics and Dynamics of Machines	Prof.Core	3	0	2	0	4	Nil	Retained	No Changes	-
35	19ME3115	Design for Manufacturing	Prof.Core	3	0	2	0	4	19ME2211	Retained	No Changes	-
36	19ME3114	Machine Design	Prof.Core	3	1	0	0	4	19ME2108	Retained	No Changes	-
37	19ME3116	Robotics and Artificial Intelligence	Prof.Core	3	0	0	0	3	Nil	Revised	Alumni	As per the feedback of Alumni, topics on Artificial Intelligence are added to the course
	19ME2106	Metrology and Measurements	Prof.Core	2	0	2	0	3	Nil	Revised	Faculty	As per the feedback of faculty member, Metrology concepts are added tot the

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38												course and is renamed as Metrology and measurements instead of measurements and Instrumentation
39	19ME2213	Vibrations and Controls	Prof.Core	3	0	0	0	3	19ME2109	Retained	No Changes	-
40	19ME3219	Heat Transfer	Prof.Core	3	0	2	0	4	19ME2107	Revised	Industry Person	As per the feedback of Industry person, topics on shape factor are added to the course
41	19ME3218	Engineering Management	Prof.Core	2	0	0	0	2	Nil	Retained	No Changes	-
42	19TS701	Skilling for Engineers-1 (Manufacturing Technologies)	Skill	0	0	0	4	1	Nil	New Course	BOS Members	To incorporate the skill in the manufacturing processes a new skilling course is introduced as per the recommendation of BOSExternal member
43	19TS702	Skilling for Engineers-2 (Control Systems for Machines)	Skill	0	0	0	4	1	Nil	New Course	BOS Members	To incorporate the skill in the Machine Control, a new skilling course is introduced as per the recommendation of BOS External member
44	19TS703	Skilling for Engineers-3 (Problem Solving techniques in Thermal)	Skill	0	0	0	4	1	19ME2107	Retained	No Changes	-
45	19TS704	Skilling for Engineers-4 (Problem Solving techniques in Design)	Skill	0	0	0	4	1	19ME1201	Retained	No Changes	-
46	19TS705	Technical Proficiency & Training-1 (Automobil	Skill	0	0	0	4	1	Nil	New Course	BOS Members	As per the recommndation of BOS members to

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		e Design and Building)										impart technical training on automobile design, a new course is drafted.
47	19TS706	Technical Proficiency & Training - 2 (Robot Design)	Skill	0	0	0	4	1	Nil	New Course	BOS members	As per the recommendation of BOS member a new course is drafted to incorporate the technical proficiency in Robot Design
48	19ME3117	Product Design & Developme nt	Flexi-Core	0	0	8	0	4	Nil	Retained	No Changes	-
49	19ME3221	Internet of Things	Flexi-Core	3	0	2	0	4	Nil	New Course	BOS Members	As per the recommendation of BOS member, a new course is drafted to impart new technology to the studetns
50	19ME3220	Machine Learning	Flexi-Core	3	0	2	0	4	Nil	New Course	BOS Members	As per the recommendation of BOS member, a new course is introduced to make students industry ready
51	19ME3222	Computer Aided Design	Flexi-Core	3	0	2	0	4	Nil	Retained	No Changes	-
52	19ME3223	Geometric Dimensioni ng and Tolerancing	Flexi-Core	3	0	2	0	4	Nil	Retained	No Changes	-
53	19ME3224	Automotive Transmissio n	Flexi-Core	3	0	2	0	4	Nil	Retained	No Changes	-
54	19ME3225	Autotronics	Flexi-Core	3	0	2	0	4	Nil	Retained	No Changes	-
55	19ME3226	Automation System Design	Flexi-Core	3	0	2	0	4	Nil	Retained	No Changes	-
56	19ME4051	Design of Transmissio n Elements	Design Specializ ation	2	0	2	0	3	19ME3 114	Retained	No Changes	-
57	19ME4052	Theory of Elasticity and		3	0	0	0	3	19ME2 108	Retained	No Changes	-

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		Plasticity											
58	19ME4053	Advanced Vibrations and Noise Control		2	0	2	0	3	19ME2213	Retained	No Changes	-
59	19ME4054	Creep, Fatigue and Fracture Mechanics		3	0	0	0	3	19ME2108	Retained	No Changes	-
60	19ME4055	Advanced Strength of Materials		2	0	2	0	3	19ME2108	Retained	No Changes	-
61	19ME4056	Mechanics of Composite Materials		2	0	2	0	3	19ME2108	Retained	No Changes	-
62	19ME4061	Modern Manufacturing Processes	STRATEGIC MANUFACTURING (3D PRINTING & RAPID PROTOTYPING)	2	0	2	0	3	19ME1003	Retained	No Changes	-
63	19ME4062	Advanced Materials		3	0	0	0	3	NIL	Retained	No Changes	-
64	19ME4063	Additive Manufacturing		2	0	2	0	3	NIL	Retained	No Changes	-
65	19ME4064	Tool Engineering and Design		2	0	2	0	3	19ME3115	Retained	No Changes	-
66	19ME4065	Flexible Manufacturing Systems		2	0	2	0	3	19ME2211	Retained	No Changes	-
67	19ME4066	Reverse Engineering and Rapid Prototyping		3	0	0	0	3	NIL	Retained	No Changes	-
68	19ME4071	Automobile Engineering	AUTOMOBILE ENGINEERING	2	0	2	0	3	NIL	Retained	No Changes	-
69	19ME4072	Automobile Engine Design		2	0	2	0	3	NIL	Retained	No Changes	-
70	19ME4073	Autotronics & Safety		2	0	2	0	3	NIL	Retained	No Changes	-
71	19ME4074	Alternative Energy Sources for Automobiles		2	0	2	0	3	NIL	Retained	No Changes	-
72	19ME4075	Automotive Electrical and Electronics System		2	0	2	0	3	NIL	Retained	No Changes	-
73	19ME4076	Automobile Engine System and Performance		2	0	2	0	3	NIL	Retained	No Changes	-
74	19ME4081	Automotive Sensor and	AUTOTRONICS	2	0	2	0	3	NIL	Retained	No Changes	-

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		Applications	(AI & DATA SCIENCE APPLICATIONS)										
75	19ME4082	Electronic Engine Management System		2	0	2	0	3	NIL	Retained	No Changes	-
76	19ME4083	Instrumentation in Automotive Industries		2	0	2	0	3	NIL	Retained	No Changes	-
77	19ME4084	Autotronics and Vehicle Intelligence		2	0	2	0	3	NIL	Retained	No Changes	-
78	19ME4085	Automotive Systems		2	0	2	0	3	NIL	Retained	No Changes	-
79	19ME4086	Programmable Logic Controller		2	0	2	0	3	NIL	Retained	No Changes	
80	19ME4091	Artificial Intelligence for Robotics	ROBOTICS AND MECHATRONICS	2	0	2	0	3	19ME3116	Retained	No Changes	-
81	19ME4092	Industrial Automation and Control		2	0	2	0	3	NIL	Retained	No Changes	-
82	19ME4093	Industrial Hydraulic and Pneumatic Systems		2	0	2	0	3	NIL	Retained	No Changes	-
83	19ME4094	Industrial Robotics and Material Handling Systems		2	0	2	0	3	NIL	Retained	No Changes	-
84	19ME4095	Micro Controllers and PLC		2	0	2	0	3	NIL	Retained	No Changes	-
85	19ME4096	Mechatronics System Design		2	0	2	0	3	NIL	Retained	No Changes	-
86	19ME4101	Programming Skills	SOFT COMPUTING (AI & ML APPLICATIONS FOR PROBLEM SOLVING IN DESIGN)	2	0	2	0	3	NIL	Retained	No Changes	-
87	19ME4102	Data Analytics		2	0	2	0	3	NIL	Retained	No Changes	-
88	19ME4103	Python		2	0	2	0	3	NIL	Retained	No Changes	-
89	19ME4104	Machine Learning		2	0	2	0	3	19ME4102	Retained	No Changes	-
90	19ME4105	Artificial Intelligence		2	0	2	0	3	19ME4102	Retained	No Changes	-
91	19ME4106	Fuzzy Logic And Neural Networks		2	0	2	0	3	NIL	Retained	No Changes	-
92	19ME4201	DESIGN FOR QUALITY AND RELIABILITY	PRODUCT DESIGN	3	0	0	0	3	NIL	New Course	Academic peer	Covers topics on various parameters related to supply chain

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												management necessary for skill development
93	19ME4202	DESIGNING INTELLIGENCE SYSTEMS	3	0	0	0	3	NIL	New Course	Academic peer	As per the recommendation of academic peer, a new course is introduced to make students understand the application of intelligent systems in Design
94	19ME4203	SUSTAINABLE DESIGN	3	0	0	0	3	NIL	New Course	Academic peer	As per the recommendation of academic peer, a new course is introduced to make students understand the concepts of sustainable design
95	19ME4204	SYSTEMS THINKING FOR DESIGN	3	0	0	0	3	NIL	New Course	Academic peer	As per the recommendation of academic peer, a new course is introduced to make students understand the how the design of different systems
96	19ME4205	DESIGN WITH ADVANCED ENGINEERING MATERIALS	3	0	0	0	3	NIL	New Course	Academic peer	A new course in product design specialization is introduced as per the feedback of academic peer to understand the application of various advanced materials in design
97	19ME4206	DESIGN FOR MANUFACTURE AND ASSEMBLY	3	0	0	0	3	NIL	New Course	Academic peer	A new course in product design specialization is introduced as per the feedback

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												of academic peer to understand the importance of manufacture and assembly during design
98	19ME40B4	ROBOTICS	Open Electives	3	0	0	0	3	NIL	Retained	No Changes	-
99	19ME40B5	MECHATRONICS		3	0	0	0	3	NIL	Retained	No Changes	-
100	19ME40B6	OPERATIONS RESEARCH		3	0	0	0	3	NIL	Retained	No Changes	-
101	OE	Management Elective	OE	3	0	0	0	3	Nil	Retained	No changes	–
102	OE	Foreign language	OE	2	0	0	0	2	NIL	Retained	No Changes	-
103	19IE3247	Term Paper	PR	0	0	4	0	2	NIL	Retained	No Changes	-
104	19IE2246	Industrial Training	PR	0	0	0	0	2	NIL	Retained	No Changes	-
105	19IE4048	Project (Part I)	PR	0	0	0	24	6	NIL	Retained	No Changes	-
106	19IE4049	Project (Part II)	PR	0	0	0	24	6	NIL	Retained	No Changes	-
107	19IE4050	Practice School	PR	0	0	0	24	6	NIL	Retained	No Changes	-
108	19IE4051	Internship	PR	0	0	0	24	6	NIL	Retained	No Changes	-
							Total	174				

Percentage of Syllabus Revision=(Total No.of courses revised + new courses)*100/Total Courses=27*100/108=25%

Percentage of Courses focusing on Employability= 8*100/108=7.4

Percentage of Courses focusing on Entrepreneurship= 3*100/108=2.77

Percentage of Courses focusing on Skill Development = 93*100/108=86.11

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19MT1101 –MATHEMATICS FOR COMPUTING

L-T-P-S : 2-2-0-2
Credits : 4.5
Contact hours 6
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
CO1	Model a system of equations for real world applications in engineering, physical and biological sciences, computer science, finance, economics and solve them through matrix algebra	PO1	3
CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional &predicate logic	PO1	3
CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees.	PO1	3
CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management.	PO1	3
CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)	PO1	2

Syllabus:

Linear Algebra:

Matrix Algebra: Introduction, Types of Matrices, Rank of matrix, Solutions of linear, Equations by Gauss elimination and Gauss Seidel methods, Eigen values, Eigen vectors. Quadratic forms

Introduction to Discrete Structures & Discrete Computation:

Relations: Closures of relations. Orders, Equivalence Relations, Functions, Finite-State Machines
Lattices: Partial order relation, Hesse Diagrams, Properties of Lattices and applications.
Logic and Proofs: Propositional Logic, Rules of Inferences, Applications of Propositional, Propositional Equivalences, Predicates and Quantifiers, Predicate logic, Consequences, Introduction to proofs, Proof methods and strategy.
Counting Techniques: Permutations and Combinations Fibonacci series, Divide-and-Conquer Algorithms, Recursive definitions, Generating Functions. Solving Linear Recurrence Relations.

Advanced Discrete Structures & Computation:

Graphs & Trees: Terminology, Types of Graphs, Bipartite graphs, Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path, Planar Graphs, Trees, Tree Traversal Applications of trees, spanning trees and Minimal spanning trees

Modeling Statistical data for real world applications:

Axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Correlation, Regression and Curve fitting.

Skilling: {Tests in skilling hours} Arithmetic:

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Foundations in Arithmetic: Numbers, Ratio, Proportion, Variation, Averages, Percentages, Profit & loss, Time & Distance, Time & Work.
Applications of Number theory: Fermat's theorem, Euclidean Algorithm. Geometry: Lines, Triangles, Quadrilaterals, Polygons, Practical applications of common solids, irregular solids and their application in various engineering problems.

Logic & Reasoning:

Sets and Venn diagrams Deductions, Logical Connectives, Linear and circular arrangements. Clocks, Calendars, Blood Relations, Cubes, Number and letter series,
Coding and Decoding, Symbolic representations of given data, Binary Logic, Non-Verbal reasoning.

Textbooks:

1. John Bird, Basic Engineering Mathematics, Sixth edition, Taylor & Francis Ltd., 2017, UK.
2. Kenneth H Rosen, Discrete Mathematics and its Applications, Seventh edition, McGraw Hill, 2007, USA.
3. Linear Algebra and Its Applications, Gilbert Strang, Fourth Edition

Reference Books:

1. Advanced Engineering Mathematics 10th Edition, Erwin Kreyszig
2. R.E. Walpole, R.H. Myers, S.L. Myes, Keying Ye, Probability and Statistics for engineers and scientist, Ninth edition, Pearson publications, 2012, USA.
3. Mott, J.L., Kandel, A. and Baker, T.P., Discrete Mathematics for Computer Scientists and Mathematicians, Second edition, Prentice Hall India Pvt Ltd, 1986, India.
4. Tremblay J P and Manohar R, -Discrete Mathematical Structures with Applications to Computer Science||, First edition, Tata McGraw Hill, 1975, India.
5. R. S. Agarwal, A Modern Approach to Verbal and Non-verbal Reasoning, S Chand Publications, 2018, New Delhi, India.

19ME2127 - ENGINEERING IN THE PHYSICAL WORLD

L-T-P-S : 1-0-2-4
Credits 3
Contact Hours 7
Pre-requisite : Nil

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Recalling and understanding the fundamental laws and concepts related to basic fluid and thermal systems.	PO2, PSO1	2
CO2	Applying the fundamental laws and concepts on basic fluid and thermal systems.	PO2, PSO1	3
CO3	Examining simple fluid and thermal systems based on existing design.	PO2, PSO1	3
CO4	Analyzing real time energy systems (flow and heat) by developing an innovative and novel design.	PO2, PSO1	4

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CO5	Modeling and analysis of energy systems (flow and heat transfer systems)	PO2, PSO1	4

Syllabus:

Behaviour at different scales – micro, macro, lumped – in engineering applications; molecular origin of thermal and mechanical phenomena; brief discussion of chemical and electrical domains: statistical mechanics to thermodynamics and macroscopic behaviour; conservations laws for energy, mass, momentum; origin and limits of macroscopic constitutive relations: physical systems: lumped approximations; equilibrium networks; elementary dynamics: and applications to energy and materials.

Text Books:

1. Engineering Thermodynamics, Nag, P.K., TMH Publications.
2. Thermoelectric refrigeration. Goldsmid H., Springer; 2013 Dec 14.
3. A Comprehensive Guide to Solar Energy Systems, Trevor Letcher, 1stEdition.
4. Fundamental of Heat Exchanger Design, R.K. Shah, 2003.

Reference Books:

1. Fundamentals of Engineering Thermodynamics, Moran, Michael J.; Shapiro, Howard N.; Boettner, Daisie D.; Bailey, Margaret B., 7th edition, Wiley publishers.
2. Fundamentals of Thermodynamics, G.J. Van Wylen., Sonntag (6E), Wiley India publications.
3. Fluid Mechanics, Frank M. White, 8th edition, McGraw Hill Publications.

20ME1103 - DESIGN TOOLS WORKSHOP -I

L-T-P-S : 0-0-4-0
Credits 2
Contact Hours : 4
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modeling	PO-3	3
CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages	PO-5	3
CO3	Understand the concept of report writing using a markup language Latex	PO-5	3
CO4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR.	PO-5	3

Course Objectives:

The primary objective of this course is to immerse students into the world of innovation as a systematic process of tackling relevant business and/or social problems. To provide a social and thinking space for

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the recognition of innovation challenges and the design of creative solutions. An innovation new ventures, value propositions, new products or services.

Syllabus:

Introduction to Design tools: Introduction to design tools course, its objective, advantages

3D Modeling: - Conceptual Design, 2D Sketches to 3D Solid Model using AUTODESK FUSION 360.
HTML: Introduction to web browser and URL, Introduction to HTML, Creating a simple HTML page, HTML documents, Concept of tags, Basic structure of HTML document, Head, Body, Paragraph creation, line breaks, text, list, tables, Hyperlinks and images.
HTML5: Basic of HTML5, Special features of HTML5, Canvas, audio, video, Geo location, drag and drop.
CSS: Concept of CSS, Need of CSS, Creating style sheet, CSS properties, CSS styling (Background, text, format, controlling fonts), Styling with lists and tables, CSS Ids and class, CSS color, Creating page layouts and site design.
Data Visualization: Introduction to data visualization, Data, types, Importance of data visualization, Different tools for visualization and comparisons in brief. Excel data explanation, Creation of column Chart, stacked bar chart and Heat map, Creation of excel dashboard. Creation of Dashboards in Power BI. Creation of bar charts, date tables and pie charts in Power BI, creating slicers and maps in power BI.
Latex Report Writing: Understanding Latex compilation, Basic syntax, Writing equations, Tables, Figures handling, List of figures, List of tables, Generating index. Applications: Writing resume, Writing project reports.
Virtual Reality & Augmented Reality: Introduction to Virtual reality, Virtual 360 Environments, Creating basic 360 Virtual frame. Introduction to Augmented reality, Different types of AR, Platforms to create AR interfaces.

Text Books:

1. -Complete Design Thinking Guide for Successful Professionals‖ by Daniel Ling
2. -Rapid Prototyping: Principles and Applications by Chua C.K., Leong and Lim. C.S, 2nd Edition, World Scientific.
3. Learn HTML & CSS by John Duckett.
4. HTML5 and CSS3 All-in-One for Dummies
5. Mastering Microsoft Power BI Expert techniques for effective data analytics and business intelligence by Brett Powell
6. LaTeX Tutorials: A Primer by Indian TeX Users Group by Indian TeX Users Group (https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf)

Web Links:

1. https://www.coursera.org/learn/3d-model-creation-fusion-360
2. https://www.coursera.org/learn/html/home/welcome
3. https://www.udemy.com/course/become-a-good-latex-user-to-create-professional- documents/
4. https://www.udemy.com/course/microsoft-power-bi-latest-2020-beginner-to-expert- modules

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19SC1209 - DESIGN TOOLS WORKSHOP -II

L-T-P-S : 0-0-4-0
Credits 2
Contact Hours 4
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Practice the design ideology by artistic skill	PO3	2
CO2	Visualize the design ideology by using VR technology	PO4	3
CO3	Visualize the design ideology by incorporating VR technique	PO5	3
CO4	Visualize and present his design idea by applying AR technique	PO4	3

Syllabus:

Design Thinking in Modern Art & Ideas: Modern Art & Ideas, Transforming everyday objects, Abstract painting, clay modeling, poetry and literary.

Virtual Reality: Hardware and History, VR Applications, Psychology of VR: the three illusions, challenges in virtual reality, Future of Embodiment in VR, Realism, Graphics, Real-Time 3D Graphics in Games, Basic Concepts in 3D Computer Graphics, Realism Animation, Navigation, Nausea.

Room Scale VR, Holography, Mirror Reality: Setting up room scale VR, Simulation of virtual environment, Stereoscopic Vision, Perspective, Interference and Diffraction, Laser Viewable Holograms, Real and Virtual Images, Introduction to mirror reality.

Augmented Reality: Augmented Reality, characteristics of AR systems and main components of an AR architecture, Augmented Reality with Geolocation,Customizing an augmented reality game.

Text Books:

1. -Complete Design Thinking Guide for Successful Professionals‖ by Daniel Ling
2. -Project Management‖ by K. Nagarajan, 7th Edition, New Age International Publishers.
3. -Augmented Reality and Virtual reality‖ by Timothy Jung, M.ClaudiaTomDieck, Springer.
4. -Rapid Prototyping: Principles and Applications‖by Chua C.K., Leong and Lim. C.S, 2nd Edition, World Scientific.
5. -Artificial Intelligence: A Modern Approach‖ by Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall.

Web References:

1. https://www.coursera.org/learn/uva-darden-design-thinking-innovation?
2. https://www.coursera.org/learn/uva-darden-design-thinking-innovation?
3. https://www.coursera.org/learn/modern-art-ideas?

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19TS701 – SKILLING FOR ENGINEERS-1 (MANUFACTURING TECHNOLOGIES)

Course Code : 19TS701
L-T-P-S : 0-0-0-6
Credits : 1.5
Contact Hours : 6
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Preparation of sand moulds with proper gating and riser system	PO4	3
CO2	Machining using machine tools and preparation of CNC part program.	PO4	3
CO3	Preparation of work piece for various welding operations and performing welding using different welding equipment	PO4	3
CO4	Production of parts using rapid prototyping	PO4	3
CO5	Hands on experience for performing experiments in Casting, Machining, Welding and Rapid prototyping	PO4	3

Course Objective:

To provide hands on experience for the preparation of sand moulds for casting with proper gating and riser system needed for casting, for attaining sound casting. To provide hands on experience of metal cutting, working of standard machine tools such as lathe, shaping, milling, drilling, grinding and CNC machine tools, preparation of CNC part program.To provide hands on experience for the preparation of workpiece to carry out various welding operations, welding using arc welding, submerged arc welding and plasma arc welding.To provide hands on experience on rapid prototyping, CAD models to rapid prototyping, production of various products using rapid prototyping.

Syllabus:

Introduction to manufacturing technologies

Casting: Preparation of sand mould using solid pattern, Preparation of sand mould using split pattern, riser, gating system, stir casting

Welding: Preparation of various joints using arc welding, submerged arc welding and plasmaarc welding.

Machining: Conventional machine tools lathe, drilling, milling and surface grinding. CNC machine tools, part programming

Rapid prototyping: Rapid prototyping operation using 3D printing technology of various components

Text Books:

1. Rao, P. N., Manufacturing Technology, McGraw Hill (2008).
2. Welding and welding technology by Richard l. Little, McGraw Hill
3. Mikell P .Groover, Emory W. Zimmers, Pearson,Publishers
4. User's guide to Rapid Prototyping by Todd Grimm; a publication from Society of Manufacturing Engineers

Reference Books:

1. Manufacturing engineering and technology, Pearson 4e , S Kalpakjian and R Schmid
2. Manufacturing Science 2e, East west, Amitabha Gosh and A K Mallik
3. Additive Manufacturing by AmitBandyopadhyay&Susmita Bose; a publication from CRC press.

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19TS702 – SKILLING FOR ENGINEERS-2 (CONTROL SYSTEMS FOR MACHINES)

Course Code : 19TS702
L-T-P-S : 0-0-0-6
Credits : 1.5
Contact Hours : 6
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand and apply the control action for first order closed loop systems for various inputs.	PO3	3
CO2	Understand and apply the control action for second order closed loop systems for various inputs.	PO3	3
CO3	Apply the concepts of stability and frequency analysis for control action on first and second order systems	PO5	3
CO4	Apply the concepts of the nature of a system by means of various control actions to stabilize the system.	PO5	3

Course Objective:

The primary objective of this course is to inculcate understanding of considerations involved in the selection of appropriate control systems as well as actuation systems for various industrial and non-industrial applications. It is expected that with this knowledge, students will be able to analyze a control system required for a given application. The course also aims at helping students acquire the ability to model a system and analyze its performance/behavior.

Syllabus:

Introduction: Systems, measurement systems, control systems, microprocessor-based controllers. **Actuation systems:** Pneumatic actuation system, hydraulic actuation, electrical actuation system.**System models:** Mechanical system, electrical system, fluid system, thermal system, electromechanical systems.**System transfer functions:** First order systems, second order system, system in series, systems with feedback loops. **Frequency response:** First order systems, second order systems, Bode plots. Closed loop controllers: Continuous and discrete processes, control modes

Text Books:

1. Bolton, -Mechatronics-Electronic Control Systems in Mechanical and Electrical Engineering‖, 2nd Edition, Addison Wesley Longman Ltd., (1999).
2. DevdasShetty, Richard A.Kolk, -Mechatronics System Design‖, PWS Publishing Company, (1997).

Reference Books:

1. David G. Alciatore, Michael B. Histand, —Introduction to mechatronics and measurement systems‖, 2nd Edition, McGraw-Hill Professional, (2002).
2. D.A Bradley, D. Dawson, N.C Burd and A. J. Loader, —Mechatronics‖ CRC Press, (2010).
3. K. Ogata, -Modern Control Engineering‖, Prentice Hall India (2002).

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Koneru Lakshmaiah Education Foundation
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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA
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19ME3221 – INTERNET OF THINGS

Course Code : 19ME3221
L-T-P-S : 2-0-2-0
Credits 3
Contact Hours 4
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand internet of Things and its hardware and software components	PO1, PO3	2
CO2	Interface I/O devices, sensors & communication modules	PO1, PO3	3
CO3	Remotely monitor data and control devices	PO1, PO3	3
CO4	Apply Data acquisition and integration	PO1, PO3	3
CO5	Develop real life IoT based projects	PO1, PO3	4

Course Objective:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

Syllabus:

Introduction to IoT: Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT

Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces, Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP

IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

IoT Case Studies: IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

Text Books:

1. Vijay Madisetti, ArshdeepBahga, Internet of Things, -A Hands on Approach‖, University Press.
2. Dr. SRN Reddy, RachitThukral and Manasi Mishra, —Introduction to Internet of Things: A practical Approach‖, ETI Labs.
3. Pethuru Raj and Anupama C. Raman, -The Internet of Things: Enabling Technologies, Platforms, and Use Cases‖, CRC Press.
4. Jeeva Jose, -Internet of Things‖, Khanna Publishing House, Delhi

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19TS705 – TECHNICAL PROFICIENCY & TRAINING-1 (AUTOMOBILE DESIGN AND BUILDING)

Course Code : 19TS705
L-T-P-S : 0-0-0-4
Credits : 1
Contact Hours : 4
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand the role of power systems and transmission systems in vehicle building.	PO1, PO5	2
CO2	Analyze about various control engineering concepts for modern automobiles.	PO1, PO5	4
CO3	Model Automobile components	PO1, PO5	4
CO4	Design of Automobile components	PO1, PO5	4

Course Objective: The objective of this course is to enable the student in assembling the automobile parts and build the appropriate design for automobiles.

Syllabus:

Study of systems in Vehicle. Power systems: Gasoline, Bio-diesel, Electrical, Hybrids, solar, wind, compressed air, fuel cell, hydrogen etc. Transmission system: Clutch, Gear Trains, Differentials, Suspension, Steering, Brakes etc.,Control Engineering Concepts for Modern Automobiles: Clutch, Gear, Dashboard display and Automatic control.

Understanding automobiles (aesthetics (exterior/interior), human factors/ vehicle packaging, display & controls etc.)Hands on Practices on Assembly and Maintenance of Automobiles (Two Wheeler& Four Wheeler).Vehicle Structure: Chassis, mononcoque, pre-stressed, sheet metal details and tooling. Vehicle development Process,Types of BIW, Standard procedures in BIW design, Exercises and techniques in BIW design, Clean edge modeling technique, Method for shaping the part, Creating complex and complex contoured depressions, Creating flanges, beads, darts.
Completion of a BIW component from drawing sheet.Design of Hood/Fender/Body side outer and side doors, Roof Design

Text Books:

1. S. P. Patil, "Mechanical System Design", Jaico Publications.
2. V. L. Maleev, "I. C. Engine", McGraw Hill Book Co. Ltd., New Delhi, Second Edition.
3. Gill P. W., Smith J. H., Zurich E. J., "Fundamentals of I. C. Engine", Oxford & IBH Pub. Co., New Delhi.
4. J. B. Heywood, "I. C. Engine Fundamentals", McGraw Hill Book Co., New Delhi.

Reference Books:

1. Litchy, I. C. Engine, McGraw Hill
2. George E. Dieter, "Engineering Design- A Material and Processing Approach", Second Edition, McGraw-Hill International Edition

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19TS706 –TECHNICAL PROFICIENCY & TRAINING -2 (ROBOT DESIGN)

Course Code : 19TS706
L-T-P-S : 0-0-0-4
Credits : 1
Contact Hours : 4
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand the importance and working of various elements of a Robot and kinematics of serial and parallel robots	PO1, PO5	2
CO2	Analyze the direct and inverse kinematics for Robot design	PO1, PO5	4
CO3	Analyze the motion planning and control of robots	PO1, PO5	4
CO4	Analyze the components of Electrical and Electronic Interface required for Automated Machine Tools	PO1, PO5	4

Course Objective:

The students are able to design a Robot like device which will serve the purpose of doing the useful task as programmed.

Syllabus:

Elements of Robots, Joints, Links, Actuators and Sensors.Kinematics of Serial and Parallel Robots.Direct and inverse kinematic synthesis for Robot design.Modeling and control of flexible robots.Motion planning and control.Components of Electrical and Electronic Interface required for Automated Machine Tools.

Capstone Project:

Step-1: Define the problem and identify the objectives

Step-2: Research must be focused and incorporate new ideas and a thorough exploration of old similar ideas.

Step-3: **The build process must take into consideration materials, processes, construction limitations, and cost.**

Step-4: The entire project must be tested to see if it does the job for which it was designed.

Text Books:

1. Ghosal, A., Robotics: Fundamental Concepts and Analysis, Oxford University Press, 2nd reprint, 2008.
2. Fu, K., Gonzalez, R. and Lee, C. S. G., Robotics: Control, Sensing, Vision and Intelligence, McGraw- Hill, 1987.

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19ME3220 – MACHINE LEARNING

Course Code : 19ME3220
L-T-P-S : 3-0-2-0
Credits 4
Contact Hours 5
Pre-requisite : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand the basic Python Programming and basic computations using Python	PO2	2
CO2	Understand and apply the basic Machine Learning and Pre-processing techniques in Machine Learning	PO3	3
CO3	Understand and apply supervised Machine Learning techniques-Regression Techniques	PO3	3
CO4	Understand and apply supervised Machine Learning techniques – Classification Techniques	PO3	3
CO5	Apply Machine Learning algorithms to solve real world problems	PO3	3

Course Objective:

At the end of this course on Machine Learning which is a challenging and highly rewarding subfield of Data science, the learner will be able to learn basic concepts of Machine learning, Algorithms and coding in a simple way. Learner will have hands-on practice in the form of implementing algorithms of Machine learning in Python programming language which are based on real life examples.

Syllabus:

Introduction to Python

Basic operations using python, strings, lists and tuples

Data Pre-processing techniques in Machine Learning

Introduction to machine learning, Data handling, Importing libraries, Data pre-processing using python, Missing data, Categorical Data

Regression algorithms in Machine Learning:

Linear regression, Logistic regression, Polynomial regression, Multivariate regression, Gradient descent method

Classification algorithms in Machine Learning:

Naïve bayes algorithm, Support vector machine (SVM), Support vector machine in regression (SVR).

Text Books:

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010.

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19ME4201 - DESIGN FOR QUALITY AND RELIABILITY

L-T-P-S : 3-0-0-0
Course code : 19ME4201
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	Model repairable and non-repairable systems and calculate failure rate, repair rate, reliability and availability	PO1	2
2	Use various probability density distributions significant to reliability calculations	PO3	2
3	Fit a given failure data set of a product into a Weibull distribution and estimate the reliability parameters.	PO3	2
4	Preventive maintenance failure modes and effects	PO3	2

Syllabus:

Quality Function Deployment / House of Quality
Six Sigma, Basic concepts of repairable and non-repairable systems

Reliability, Availability and Maintainability

Fitting discrete and continuous distributions to failure data sets, Weibull analysis, estimation of important reliability parameters

Markov modeling of repairable and non-repairable systems

Reliability Logic Diagrams, Fault-tree analysis

Preventive and Predictive maintenance: Failure Modes and Effects Analysis.

Text Books:

1. Louis Cohen, Joseph P. Ficalora, *Quality Function Deployment and Six Sigma: A QFDHandbook*, Prentice Hall, Second Edition, 2009, ISBN: 9780137035441.
2. VNA Naikan, *Reliability Engineering and Life Testing,* PHI Learning, 2010, ISBN: 978- 8120335936.
3. Singiresu S Rao, *Reliability Engineering,* Pearson Education, 2014, ISBN: 978-0136015727

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19ME4202 - DESIGNING INTELLIGENCE SYSTEMS

L-T-P-S : 3-0-0-0
Course code : 19ME4202
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	Principles of complex and living systems	PO1	2
2	Concepts such as Information intensity & Knowledge	PO3	2
3	Introduction to emerging digital technologies	PO3	2
4	Apply these ideas in design	PO3	2

Syllabus:

Design Metaphors & Patterns (incl biomimetic)

Metaphors such as living systems, complex networks, viable systems

Key principles governing living / complex systems (Self-organization, self production, recursion, fractal)

Increasing information-intensity in products

- Concept of information intensity vs material/energy intensity
- Self-learning, usage patterns, early warning systems
- Using data, voice, collaborative technologies (semantic, big data, speech, Remote-help, Indic computing), Internet-of-things
- Synthesizing the above ideas for creative design.

Text Books:

1. H. G. Hey, A. M. Agogino, —Metaphors in Conceptual Design,|| ASME Design Engineering Technical Conferences, Las Vegas, Nevada, in review, 2007.
2. H. Casakin, and G. Goldschmidt, —Expertise and the Use of Visual Analogy:Implications for Design Education,|| Design Studies, 20(2), 153-175, 1999.
3. Kryssanov, V. V., Tamaki, H. and Kitamura, S., —Understanding Design Fundamentals: How Synthesis and Analysis Drive Creativity, Resulting inEmergence,|| Artificial Intelligence in Engineering, 15, 329 – 342, 2001.

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19ME4203– SUSTAINABLE DESIGN

L-T-P-S : 3-0-0-0
Course code : 19ME4203
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	To equip the design student with specific environmentally-responsive tools, principles	PO1, PO3	2
2	To understand the methodologies in preparation for professional application. Management	PO1, PO3	2
3	To use a variety of techniques to communicate effectively	PO1, PO3	2
4	To understand the life-cycle assessment methods	PO1, PO3	2

Syllabus:

Introduction, Definitions, History, the environmental origins of sustainability, theory of sustainability. Environmentally-responsive design methodologies. Industrial ecology, dematerialization, design for reuse
/ modularity, design for recycling, Remanufacturing: issues/problems, current and future developments Alternative resources, alternative energy, alternative materials, sustainable packaging. Life-cycle assessment methods.

Text Books:

1. Victor Papanek, *The Green Imperative*, 1995, ISBN: 978-0500278468
2. William McDonough and Michael Braungart, *Cradle to Cradle*, 2009, ISBN: 978-0099535478.
3. Stuart Walker (2006), *Sustainable by Design: Explorations in Theory and Practice*, ISBN:978- 44073535
4. Charter, Tischner, *Sustainable Solutions*, Green Leaf Publishing, 2001, ISBN: 978-1874719366.

19ME4204 - SYSTEMS THINKING FOR DESIGN

L-T-P-S : 3-0-0-0
Course code : 19ME4204
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	The importance of modeling systems to realize effective designs	PO1, PO3	2
2	Abstraction of key elements from problem situations	PO1, PO3	2
3	Use of specific techniques to model problems in a holistic manner	PO1, PO3	2
4	Use of specific techniques for self-regulating systems	PO1, PO3	2

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Syllabus:

Real-world problems & the need for inter-disciplinary approaches Basic concepts of systems thinking (parts, relations, patterns)

Technique #1: Rich Pictures

Technique #2: Mapping Stakeholder, Needs, Alterables,

Constraints Technique #3: Structural Modeling (Hierarchical

decomposition) Technique #4: Influence Diagrams (Self-

regulating systems)

Text Books:

1. Hitchins, Derek K. (2007) Systems Engineering: A 21st Century Systems Methodology, John Wiley, ISBN: 978-0-470-05856-5.
2. Wilson, Brian (1991) Systems: Concepts, Methodologies and Applications. 2nd Edition, Wiley. ISBN: 0471927163.
3. Hutchinson, William; Systems Thinking and Associated Methodologies, Praxis Education. ISBN: 0 646 34145 6.

19ME4205 – DESIGN WITH ADVANCED ENGINEERING MATERIALS

L-T-P-S : 3-0-0-0
Course code : 19ME4205
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	Understanding selection of materials for various engineering application	PO1, PO3	2
2	Understanding the need of high temperature materials (super-alloys)	PO1, PO3	2
3	Understanding the need of engineering plastics, elastomers	PO1, PO3	2
4	Understanding the need of ceramics, and coatings	PO1, PO3	2

Syllabus:

Engineering Design process and the role of materials; materials classification and their properties; material property charts; selection of materials based on function, objective, constraints and free variables; examples of material selection for typical applications; Computer aided materials selection. Selection of process based on material classification; pencil curve approach; material selection for multiple constraints and multiple objective cases; multiple constraints and conflicting objectives. Co-selection of material and shape; concept of macroscopic and microscopic shape factors; Four quadrant method of material selection. General Properties of plastics, polymers and elastomers; visco-elastic properties; short-term and long-term properties of plastics; mathematical modeling of plastic

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properties; Maxwell, Kelvin-Voigt Models; fatigue and fracture of plastics; selection of plastics based on mechanical properties, degradation due to environment, wear; Design methods for snap fits; case studies. Fundamentals of fiber reinforced plastics; Stress, strain analysis of continuous fiber composites, rule of mixtures, general deformation behavior of laminates. Introduction to high temperature materials; families of super alloys and their characteristics; creep and fatigue resistance of super alloys; role of precipitates in strengthening of super alloys; repair of super alloys after creep damage; coatings for high temperature materials. Fundamentals of ceramics, general properties, applications of ceramics for critical applications. Design considerations. Surface treatment of materials using coatings; type of coatings; PVD and CVD coatings.Basics of electro-plating and electro-less plating.

Text Books:

1. Ashby, M.F., —Materials Selection in Design‖, Butterworth-Heinemann, 4/e, 2010.
2. Crawford, R. J., —Plastics Engineering‖, Butterworth-Heinemann, 3/e,2002.
3. Donachie, M. J. and Donachie, S. J., -Super alloys: A technical guide‖, ASM International, 2002.

Reference Books:

1. Carter, C.B., and Grant, N. M., -Ceramic Materials: Science and Engineering‖, Springer, 2007.
2. Bralla, J. C., —Design for Manufacturability Handbook‖, McGraw-Hill Professional; 2/e, 1998.

19MEA206– DESIGN FOR MANUFACTURE AND ASSEMBLY

L-T-P-S : 3-0-0-0
Credits 3
Contact Hours 3
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	Understand the importance of DFMA and various manufacturing processes	PO1, PO3	2
2	Understand the various machining processes and the respective design rules	PO1, PO3	2
3	Understand the procedure and advantages of Assembling	PO1, PO3	2
4	Understand the principles in Design of Manual Assembly	PO1, PO3	2

Syllabus:

Introduction to DFMA: History of DFMA, Steps for applying DFMA during product design, Advantages of applying DFMA during product design, Reasons for not implementing DFMA, Introduction to Manufacturing Process: Classification of manufacturing process, Basic manufacturing processes, Mechanical properties of material: Tensile properties, Engineering stress-strain, True stress strain, Compression properties, Shear properties, Introduction to materials and material selection: Classification of engineering materials, Material selection for product design

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Overview of various machining processes — general design rules for machining – Dimensional tolerance and surface roughness — Design for machining — Ease — Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts. Metal Casting: Appraisal of various casting processes, selection of casting process, – general design considerations for casting — casting tolerances — use of solidification simulation in casting design — product design rules for sand casting.

Assemble Advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation. Automatic Assembly Transfer Systems : Continuous transfer, intermittent transfer, indexing mechanisms, and operator – paced free – transfer machine.

Design of Manual Assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening.

Text Books:

1. J. Lesko, (1999) Industrial Design, Materials and Manufacture Guide, John Willy andvSons, Inc
2. George E. Dieter and Linda C. Schmidt (2009), Engineering Design, Fourth edition, McGraw-Hill companies, New York, USA
3. Geoffrey Boothroyd, Peter Dewhurst and Winston Knight (2002) Product Design for Manufacture and Assembly, Second Edition, CRC press, Taylor & Francis, Florida, USA

19BB11C6-CAMPUS TO CORPORATE

L-T-P-S : 0-0-2-0
Credits :1
Contact Hours :2
Pre-requisites : NIL

Mapping of Course Outcomes with PO/PSO:

CO#	Course outcome	PO/PSO	BTL
1	To enable students to adopt to the new corporate environment	PO1	6
2	To develop interpersonal skills required for working in the corporate world	PO9	3
3	Analyze the corporate communication skills	PO10	4
4	Develop the confidence to handle a wide range of difficult and demanding situations more effectively	PO5	3

Syllabus:

Interpersonal Skilling: Self-introduction, Draw a Picture, Story writing, Dumb charades, JAM. Basic Letter writing - Letter Writing Layout Prepositions, Invitations. Industry analysis: Nature of industry, Players in the industry, Nature of competition from economist perspective. Logical Reasoning: Puzzle, Picture Puzzle, Relational Puzzle, Data Sufficiency, Data Interpretation, Syllogism.

Text Books:

1. Edgar Thorpe & Showick Thorpe: Objective English for Competitive Examinations; Pearson, 2017
2. Dr. K. Alex: Soft Skills; S. Chand, 2018.

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ANNEXURE-4

Program: Mechanical Engineering
Course Title: Finite Element Analysis of Solids and Fluids
Course Code: 17ME3117
Year: **III / IV**

Existing Syllabus/COs	Proposed Syllabus/COs	Topics or COs added/removed/modified	Justification for the modifications
Finite element methods for analysis of steady-state and **transient** problems in solid, structural, fluid mechanics, and heat transfer. Presents finite element methods and solution procedures for linear and **nonlinear** analyses using largely physical arguments. Demonstrates finite element analyses. Includes modeling of problems and interpretation of numerical results	Finite element methods for analysis of steady-state problems in solid, structural, fluid mechanics, and heat transfer. Presents finite element methods and solution procedures for linear analyses using largely physical arguments. Demonstrates finite element analyses. Includes modeling of problems and interpretation of numerical results.	Removed • Transient Problems • Non-Linear Problems	The topics removed are of advanced and hence the course offered to the Students as Introduction to Finite Elements.

Program: B.Tech
Course Title: Design and Manufacturing - I
Course Code: 18ME2211 & 17ME3114

Year: **II/IV & III/IV** **Existing Syllabus/COs**	Proposed Syllabus/COs	Topics or COs added/removed/modified	Justification for the modifications
Emphasis on the creative design process bolstered by application of physical laws. Instruction on how to complete projects on schedule and within budget. Robustness and manufacturability are emphasized. Subject relies on active learning via a major design-and build project. Lecture topics include idea generation, estimation, concept selection, visual thinking, computer-aided design (CAD), mechanism design, machine elements, basic electronics, technical communication, and ethics Lab: Introduces the fundamentals of machine	**Casting Processes** Patterns and Pattern making, Moulding methods and processes, sand preparation and control, testing, cores and core making. Design considerations in casting, gating and Riser - directional solidification in castings, Metallurgical aspects of Casting, Sand castings, pressure die casting, permanent mould casting, centrifugal casting, precision investment casting, shell Moulding, continuous casting-squeeze casting, electro slag casting, Fettling and finishing, casting defects and Inspection of castings. **Basic Joining Processes** Types of welding-gas welding, -arc welding,-shielded metal arc welding, GTAW, GMAW, SAW, ESW-Resistance welding (spot, seam, projection, percussion, flash types)-atomic hydrogen arc welding-thermit welding, Flame cutting - Use of Oxyacetylene, modern	**Topics added:** Casting Processes, Joining Processes, Hot/cold forming processes, extrusion and sheet metal forming processes. **Topics removed:** Idea generation, estimation, concept selection, visual thinking, computer-aided design (CAD), mechanism design, machine elements, basic electronics, technical communication, and ethics	Clearly elaborated the syllabus to teach in the blended way Included CAD and machine tool processes in the DM-II course. The concept of hot/cold forming processes, extrusion and sheet metal forming processes are included as they are necessary for the mechanical engineer now a days in placement point of view and competitive examinations

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tools use and fabrication techniques. Students work with a variety of machine tools including the bandsaw, milling machine, and lathe.	cutting processes, arc cutting, Soldering, brazing and braze welding and their application., welding of special materials – Stainless steel, Aluminium etc. weldability of cast iron, steel, stainless steel, aluminium alloys. Introduction to Electron beam and Laser welding, weld stress-calculations, design of weld size, estimation of weld dilution, heat input, effect of welding parameters preheating, and post heating temperature: Selection of electrodes, flux etc. Inspection of welds, Defects in welding, causes and remedies, **Metal Forming :** cold/hot forming processes, Metallurgical aspects of metal forming, yield criteria and their significance, Forging and rolling processes: Forging principle, parameters and calculation of forces and power requirements during forging, Rolling processes, calculation of forces and geometrical relationship in rolling, analysis of rolling load, torque and power. Form rolling, rolling defects, causes and remedies. **Extrusion and Drawing Processes:** Extrusion force calculation-defects and analysis **Sheet metal forming processes:** conventional and HERF processes-presses-types and selection of presses, formability of sheet metals, electro hydraulic forming, magnetic pulse forming. Press work – coining, embossing etc., Design of sheet metal dies.		

Program: **B. Tech**
Course Title: **COMPUTATIONAL THINKING AND DATA SCIENCES**
Course Code: **17ME2005**

Year: **III / IV Existing Syllabus/COs**	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
Optimization Problems: Introduction, analytical method, graphical method and numerical method. **Plotting:** Introduction to Plots, Implementing and using Plots, Plot optimization problems. **Stochastic Programs:** Stochastic Processes, implementing a Random Process, Independence, A Simulation of Stochastic Program, Output of Simulation, Morals, Approximating Using a	**Introduction to Python and Optimization:** Python Introduction, Installation, Print Function and Strings, Math with Python, Variables, While Loop, For Loop, If Statement, If Else, If Elseif Else, Functions, Function Parameters, Function Parameter Defaults, Global and Local Variables, writing to a File, Appending Files, Reading from Files, Classes, Introduction to Optimization Problems.	**Topics Added:** Introduction to Python, Data Reading and Manipulation using Python, Data Analysis with 2D Plotting, Data Analysis with 3D Plotting. **Topics Removed:** Clustering.	The existing Syllabus of *Computational Thinking and Data Sciences* is very hard for the B.Tech, Third year I semester students without any pre requisites. So, I would like to propose the following syllabus for the Third-Year I semester students, to introduce knowledge of Python 3.x programming language, and to do Data Analysis with Python, Matplotlib and Pandas.

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Simulation, Simulation Models. **Probability and Statistics:** Sampling error and Standard error, Probability sampling, Means and Standard Deviations, Standard error of the Mean, Assessing the Standard error of the Mean. **Random Walks:** Introduction, Structure of Simulation, simulating a single walk, Simulating multiple walks. **Monte Carlo Simulations:** Introduction to Monte Carlo method, Applications of Monte Carlo method in Engineering. **Modeling Data:** Data Study, Curve fitting to the Data. **Clustering:** Introduction, Hierarchical clustering, K-means clustering.	**Data Reading and Manipulation using Python:** Getting User Input, Statistics Module, Module import Syntax, making your own Modules, Lists and Tuples, List Manipulation, Multi-Dimensional Lists, Reading CSV files, Stochastic Programs, Probability and Statistics. **Data Analysis with 2D Plotting:** Matplotlib Introduction, Matplotlib Basics, 2D graphs in Matplotlib, 2D Scatter Plot with Python and Matplotlib, More 2D Scatter-Plotting with custom colors, 2D Bar Charts, Random Walks, Monte Carlo Simulations. **Data Analysis with 3D Plotting:** 3D graphs in Matplotlib, 3D Scatter Plot with Python and Matplotlib, More 3D Scatter-Plotting with custom colors, 3D Bar Charts, 3D Plane Wireframe Graph, Live Updating Graphs with Matplotlib, Pandas Introduction, Pandas Basics, Modeling Data.		

Program: **B.Tech**
Course Title: **PROBLEM SOLVING TECHNIQUES IN THERMAL**
Course Code: **17TS703**

Year: **III/IV Existing Syllabus/COs**	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
Syllabus: Introduction to CFD (Computational Fluid Dynamics) Flow Visualization: Introduction, Classification of visualization techniques, Interferometer, Schlieren and shadow graph. Analog Methods: Introduction, Hele-shaw apparatus, Hydraulic analogy, Hydraulic jump. Dimensional analysis: Reynolds theorem and	**Syllabus:** Introduction to CFD (Computational Fluid Dynamics) Internal fluid flows External fluid flows Steady and transient heat transfer Combined study on fluid flow and heat transfer **Course Outcomes:** CO-1: Analysis of fluid flow through pipes or channels (internal flow) CO-2: Analysis of fluid flow	The existing syllabus is covered only fluid flow related aspects. Now, the course team is proposed to add heat transfer related aspects to the existing fluid flow. Since it is pure skilling course, the experiments proposed are fall in the topics mentioned in syllabus, which are given broadly. The earlier 3 Course Outcomes were revisited and reframed in 4 course	The existing syllabus framed for 1-0-2 structure. Now, the course is of 0-0-0-4 structure. Hence, the syllabus is modified accordingly

Buckingham π theorem. Boundary layer theory: Introduction, laminar, turbulent boundary layer, boundary layer thickness, displacement, momentum & energy thickness, growth of boundary layer over flat plate, pressure distribution in the boundary layer, separation of boundary layer. Analysis of Compressible Flow: Mach number and its significance, isentropic flow in passage of varying cross section, normal shockwaves in supersonic flow, shock equations, change in entropy across normal shock. Basic concepts of drag and lift of an aerofoil. **Course Outcomes:** CO-1: Understand the Flow Visualization, Analog Methods, Dimensional analysis and Basic concepts of drag and lift of an aerofoil. CO-2: Analysis of Compressible Flow and Boundary layer theory CO-3: Apply the fluid mechanics theoretical concepts to conduct various experiments by using ANSYS FLUENT	over different geometrical objects (external flow) CO-3: Analysis of steady and transient heat transfer through various systems CO-4: Analysis of fluid flow and heat transfer from various systems	outcomes accordingly.	

Program: B.Tech
Course Title: Machine Drawing
Course Code: 18ME2110

Year: **II/IV Existing Syllabus/COs**	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
Need for drawing – Principles of Drawing Title boxes, their size, location and details. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and principle of dimensioning, counter sink, counter bores, spot faces, chamfers, screw threads, tapered features. Types of Machine drawings Conventional representation of	Review: Orthographic projection, missing lines, Interpolation of views and sectioning Part and assembly drawing Introduction, assembly drawing of stuffing box, steam engine cross head, air valve, Lathe tailstock, gate valve, screw jack, connecting rods, spark plug, tool post, safety Valves etc. Drawing exercises. Specification of materials: Engineering materials, code	Production drawing and Computer Aided Drafting topics were included in syllabus	Keeping in view the importance of production drawing and CAD, and as they are not covered in any other courses. They were included in this course

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materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs Types of sections. Limits, Fits and Tolerance **DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS:** **Screwed Fasteners** **Bolts and nuts** **Joints** **Shaft Coupling** **ASSEMBLY DRAWINGS:** Introduction, Stuffing box, Eccentric, Screw jack, Lathe tail stock. **PART DRAWINGS:** Introduction, Single tool post, Plummer Block, I C Engine connecting rod	designation of steels, copper, and aluminum and its alloys. Limits, tolerances and fits: Introduction, limit systems, tolerance, fits drawing exercises. Surface roughness Introduction, surface roughness, machining symbols, identification of surface roughness drawing exercises. Production drawing: Introduction to developing and reading of production drawing of simple machine elements like helical gear, bevel gear, flange, pinion shaft, connecting rod, crank shaft, belt pulley, piston details etc, idea about tool drawing. Computer aided drawing Introduction, input, output devices, introduction to drafting software like Creo/ Solidworks, basic commands and development of simple 2D and 3D drawings.		

Program: B.Tech
Course Title: Problems Solving Techniques in Design
Course Code:18TS704

Year: **2nd Year 1st Sem** **Existing Syllabus/COs**	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
ENGINEERING DESIGN Introduction: Engineering Design Process, Importance of Engineering Design process, Types of Design, ways to think about engineering design process, Considerations of Good Design, Description of Design process. **DESIGN PROCESS AND TOOLS** Problem Definition and Need identification, Gathering Information, Concept Generation, Decision Making and Concept Selection; Embodiment Design; Detail Design; Modeling and Simulation. **PROJECT MANAGEMENT:** Tools and Techniques of Project Management. **Capstone Project:** 1. Four contact hours are allocated for training the students in modeling software and analysis software and remaining four contact hours are allocated for Capstone Project. Student has	Introduction to Design and FEM and Problem Solving Methods. Static Analysis: Static loads, Eigen Value Buckling Analysis. Dynamic Analysis: Modal Analysis, Harmonic Analysis, Fatigue analysis, Random Analysis. Analysis of metals and composites: Linear and non-linear, Static structural and dynamic analysis of Beams (Statically Determinate and indeterminate), Pressure Vessels (Thick and Thin), Torsion of Shafts, Plates (Finite Width and Infinite Width) Stress concentration Factors for geometrical imperfections. Shafts subjected to combined loading, Effect of chamfers and fillets. Pretension of bolts, Fatigue (Low cycle and high cycle), Generation of S-N curve from Low cycle fatigue. Analysis of fracture modes.	**DESIGN PROCESS AND TOOLS** Gathering Information, Concept Generation, Decision Making and Concept Selection; Embodiment Design; Detail Design; Modelling and Simulation. **PROJECT MANAGEMENT:** Tools and Techniques of Project Management.	Hence for this batch of students, machine design and design of transmission elements were not covered. They will be studying machine design simultaneously with this course.

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to design a modal using Solid works or CATIA and do analysis using ANSYS or Hyperworks or any analysis software. 2. After completion of the project student has to submit the report.	**Capstone Project:** Design and model using Solid works or CATIA of mechanical component / system and do analysis using ANSYS/ Hyperworks/NASTRAN or any analysis software. After completion of the project student must submit the report.		

Program: B.Tech
Course Title: Measurements and instrumentations
Course Code:

Year: **2nd year Existing Syllabus/COs**	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
Experimental techniques for observation and measurement of physical variables such as force, strain, temperature, flow rate, and acceleration. Emphasizes principles of transduction, measurement circuitry, MEMS sensors, Fourier transforms, linear and nonlinear function fitting, uncertainty analysis, probability density functions and statistics, system identification, electrical impedance analysis and transfer functions, computer-aided experimentation, and technical reporting. Typical laboratory experiments involve oscilloscopes, electronic circuits including operational amplifiers,	Definition – Introduction to measurements, Precision and accuracy, generalized configuration and functional descriptions of measuring instruments – examples. Errors in measurements – sources of error, Classification and elimination of error. Measurement of Displacement: Theory and construction of various transducers to measure displacement– Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures. Measurement Of Temperature: Classification – Ranges – Various Principles of measurement– Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers–Temperature Indicators.Measurement Of Pressure: Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauges. Measurement Of Level: Direct method – Indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – Bubler level indicators.Flow Measurement: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer(LDA). Measurement Of	electronic circuits including operational amplifiers is removed	Removed Topic Not related to mechanical engineering. Other topics in the syllabus have been elaborated

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thermocouples, strain gauges, digital recorders, lasers etc.,	Speed : Mechanical Tachometers – Electrical tachometers – Stroboscope, Non contact type of tachometer Measurement of Acceleration and Vibration : Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.Stress Strain Measurements : Various types of stress and strain measurements – electricalstrain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive andtensile strains – usage for measuring torque, Strain gauge Rosettes.Measurement of Force, Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers. Computer assisted data acquisition, data manipulation, data presentation.		

Program: B.Tech
Course Title: Automotive Transmission
Course Code: 16ME4073
Year: **IV year**

Existing Syllabus/COs	**Proposed Syllabus/COs**	**Topics or COs added/removed/modified**	**Justification for the modifications**
Clutches: Principle, Functions, Requirements, Torque capacity, lining materials. Gear Box: Necessity, Types, Sliding mesh, Constant mesh, Synchromesh, Synchronizing unit, Helical gears, Gear selector mechanism, Overdrive gears, Compensation for wear, Performance characteristics. Drive Lines: Effect of driving thrust and torque reaction, Propeller shaft-universal joints, Drive line arrangements, i.e. Hotchkiss drive & torque tube drive, Rear & front wheel drive layouts. Final Drive & Rear Axle: Final drive & drive ratio, Types, Need of differential and differential	CO1: Clutches need types-design of single plate clutch, multi plate clutch, centrifugal clutch, cone clutch, electromagnetic clutch, over running clutch, mechanical and hydraulic clutch, torque capacity of clutch-trouble shooting service procedure. CO2: Gearbox need, speed selection , sliding mesh, constant mesh, synchromesh , over drives, total resistance to motion traction and tractive effort, acceleration, calculation of gear ratio for vehicles, design of gear boxes , gear materials, lubrication. CO3: Principal of torque conversion, performance characteristics, constructional and operational details of typical hydraulic transmission drives. Automatic transmission: relative merits and demerits when compared to conventional transmission, epicyclic and hydrometric	Topics added: Calculation of gear ratio for vehicles, design of gear boxes, gear materials, lubrication, Automatic transmission: relative merits and demerits when compared to conventional transmission, epicyclic and hydrometric transmission	CO1: Understand different components that are used in transmission mentioning its necessity and the troubleshooting of the clutch in vehicles. CO2: Understand the importance of transmission and working principles of different types of gear box and their design and design of stages of gear box. CO3: Identification and understanding of the Different mechanisms used while adopting a torque converter CO4: Understand the importance of driveline components that are used in transmission

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unit, Rear axle, Axle types, Axle shafts, Final drive. Transmission with Fluid Flywheel & Torque Convertor: Operating principle, Fluid flywheel, Characteristics, Advantages & limitations of fluid coupling. CONTINUOUS VARIABLE TRANSMISSION (CVT), Applications, Advantages and disadvantages.	transmission, continuously variable transmission. CO4: Effect of driving thrust and torque reactions for Hotchkiss drive, torque tube drive, propeller shaft, universal joints, slip joint ,front wheel drive, rear wheel drive, double reduction, differential construction details, non-slip differential, differential locks- rear axle assembly, types, multi axle vehicles, introduction to Power train design.		mentioning its necessity and use of differential in heavy vehicles.

Program: **B.Tech**
Course Title: **Modern Manufacturing Processes**
Course Code: **16ME4160**
Year: **IV/IV**

Existing Experiments	Proposed Experiments	Experiments added/removed/modified	Justification for the modifications
1. Preparation of a square specimen using WEDM. 2. Preparation of a rectangular specimen using WEDM 3. Measuring the Coordinate points using CMM 4. Hardness test of MMC using Rockwell Hardness 5. Weld preparation by using MMAW Technique 6. Mount preparation of the MMAW specimen by using specimen mounting press 7. Micro structural study of MMAW zone 8. Weld preparation by using SAW Technique 9. Mount preparation of the SAW specimen by using specimen mounting press 10. Micro structural study of SAW zone. 11. Finding the optimal level of milling process	1. To study pulsed-heating of materials 2. To study erosion mechanism from Lazarenko's model 3. To study various thermal models for EDM 4. To study influence of process parameters on the Wire EDM 5. Laser hardening using NdYAG laser system 6. Laser spot welding using NdYAG laser system 7. Study of Electrochemical machining process 8. Study the effect of process parameters in electrochemical grinding 9. Preparation of a square specimen using WEDM. 10. Preparation of a rectangular specimen using WEDM 11. Measuring the Coordinate points using CMM	**Experiments Added:** 1 to 8 of proposed **Experiments removed:** 4, 5, 6, 7, 8, 9, 10 and 11 of existing	Vlabs- An Initiative of MHRD Under the National Mission on Education through ICT and also due to renovation of existing laboratories.

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Program: B TECH

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Course Title: **AUTOMOBILE ENGINEERING**
Course Code: **16ME4071**
Year: **IV/IV**

Existing Syllabus/COs/Experiments	Proposed Syllabus/COs/Experiments	Topics or COs or Experiments added/removed/modified	Justification for the modifications
Simulation and analysis of automobile Engine using Lotus Engine simulation software (LSA). 2. Simulation and analysis of automobile suspension system using Lotus Simulation Analysis software. 3. Modelling and thermal analysis of automobile engine piston using ANSYS software tool. 4. Structural Analysis of Propeller shaft using ANSYS software. 5. Simulation and analysis of friction clutch using ADAMS software. 6. Modelling and structural analysis of front axle using ANSYS software. 7. Simulation and analysis of car suspension system using ADAMS software. 8. Structural analysis of knuckle joint using ANSYS. 9. Structural analysis of Automobile frame using ANSYS. 10. Simulation and analysis of spur gear using ADAMS. 11. Structural analysis of rear axles using ANSYS software 12. Structural analysis of leaf spring of a bus using ANSYS.	1.Basics of programming using MATLAB 2. Modelling an Engine piston with MATLAB 3. To Create a GUI with MATLAB 4. Modelling of a vehicle power train 5. Radar System Modelling and Simulation for Automotive Advanced Driver Assistance Systems 6. Computer Vision for Automated Driving in MATLAB 7. Understanding Model Predictive Control 8. Path Planning and Navigation for Autonomous vehicles 9. Lane Keeping Assist System Simulation in MATLAB/SIMULINK 10. A study on Driving scenario designer	LSA software is replaced with MATLAB and Simulink softwares	1. Lab experiments planned are related to design 2. The software (LSA) used is not available, so the lab experiments are planned according to topics in the syllabus which is approved in BOS 3. Currently designed experiments are related to single software i.e mat lab and simulink. 4. Previously designed experiments are designed with 3 different soft wares so students may feel difficult to carry out the experiments.

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Syllabus of Value Added/Certificate Courses

DEPARTMENT OF MECHANICAL ENGINEERING

Certificate Course Syllabus for the A.Y 2019-2020

Course Title : AutoCAD	**Course Code :** 18CC3001, 19CC3001, 20CC0006, 21CC0006
Category : Employability	**Level-1:** for Y18, Y19, Y20,Y21 Batch of Students
Mode : Offline Teaching and CC Exam on Online	**Duration :40 Hrs** (4 Hrs/Week x 10 Week)
Source: Certified and Trained Faculty from Department	
CC Outcome: Registered students will learn about all the tool bars in AutoCAD package and able to draw Orthogonal, Sectional and Isometric Views of Machine Components as per the given dimensions.	
Title of Global Certificate : Autodesk Certified User - AutoCAD	

SYLLABUS

S.No	Topic	Course Content	Duration in Hrs
1	**Basic Drawing Skills**	User Coordinate System, Create Selection Sets, Use Dynamic Input, Direct distance	4
2	**Draw Objects**	Draw Lines, Rectangles, Circles, Arcs, Poly lines and Polygons	4
3	**Draw with Accuracy**	Working with Grid and Snap, Use object-snap tracking, Use Coordinate Systems	4
4	**Modify Objects**	Move and Copy objects, Rotate, Scale objects, Create and Use Array, Trim and Extend Objects, Offset, Mirror objects, Chamfer and Fillet object corner	8
5	**Additional Drawing Techniques**	Draw and Edit Poly lines and apply Hatches and Gradients	8
6	**Organize Objects**	Change Object Properties, Layers, and control the Visibility	4
7	**Annotate Drawings**	Add and Modify text, Use Dimension Tool	4
8	**Layout and Printing**	Page Set, Setting Printing and Plotting options.	4
		Total Course Duration:	**40 Hrs**

Course Title : Autodesk Inventor (3D Modelling)	**Course Code :** 19CC3006, 20CC0007,21CC0007
Category : Employability	**Level-2:** for Y19,Y20, Y21 Batch of Students
Mode : Offline Teaching and CC Exam on Online	**Duration : 40 Hrs** (4 Hrs/Week x 10 Week)
Source: Certified and Trained Faculty from Department	
CC Outcome: Students will learn the procedure and techniques to Model and Assemble 3D Machine components per the given dimensions, Generate orthographic views using Drawing Module.	

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Title of Global Certificate : Autodesk Certified User – Autodesk Inventor

SYLLABUS

S.No	Topic	Course Content	Duration in Hrs
1	USER INTERFACE AND NAVIGATION	Change the viewpoint using the View Cube, Change setting of the View Cube, Understand Inventor file types and standard templates	2
2	SKETCHING	Assign parameters Identify dimension types Share sketches Use sketch constraints Project geometry	8
3	PART MODELING	Create parts Apply fillets and chamfers, Create a pattern of features, Create a Rib Feature, Create a shell feature Create extrude features, Create hole features	10
4	ASSEMBLY MODELING	Apply basic assembly constraints (mate, flush, insert, directed angle) Ground base component of an assembly Apply an offset to constrained parts, Determine the degrees of freedom of a component Create a presentation model	10
5	DRAWING	Control sheet size and add a title block Select and place a front view Create a drawing view from an existing view Add annotation and dimensioning to a drawing Add sheets to a drawing Create a drawing view based on an assembly and presentation file Add balloons to a drawing Create and edit a parts list in a drawing	8
6	BROWSER EDITING	Reorder features Delete features	2
		Total Course Duration:	**40 Hrs**

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Course Title : Autodesk Fusion 360 (Modelling)	**Course Code :**19CC3005, 20CC0032,21CC0032
Category : Employability	**Level-3:** for Y19,Y20, Y21 Batch of Students
Mode : Offline Teaching and CC Exam on Online	**Duration : 40 Hrs** (4 Hrs/Week x 10 Week)
Source: Certified and Trained Faculty from Department	
CC Outcome: Students will learn the procedure and techniques to Model and Assemble 3D Machine components per the given dimensions, Generate orthographic views using Drawing Module.	
Title of Global Certificate : Autodesk Certified User – Autodesk Fusion 360	

SYLLABUS

S.No	Topic	Course Content	Duration in Hrs
1	**Sketching**	Sketch Creation Create Dimensions Constraint selection and creation Edit a sketch Project Edges Edit a Sketch	5
2	**Drawing**	Creating a Drawing View, Base, Projected, Section, Detail Add Annotations Editing a Created View Edit Border and Title block	5
3	**Sculpt**	Create a Form Edit a Form Thicken a Form	3
4	**Direct Modelling**	Feature Deletion Press & Pull Too	3
5	**Part Modelling**	Create extrude features Apply Fillets and Chamfers Create complex hole features Create revolve features Create a pattern of features Create a shell feature Create Construction Planes and Axes Inspect command; measure, and section analysis	10
6	**Advanced Modelling**	Sweep and Loft Boundary Fill Split and Combine bodies	4
7	**Assembly Modelling**	Create and Manage Top Level Assembly and Subassemblies Create a Component From a Body Align and Assembly Joints Interference Rigid Groups Motion Studies	5
8	**Practice Exercises**	Modelling and Assembly of Screw Jack, Stuffing Box, Single Lathe tools Post, Flanged Coupling	5
		Total Course Duration:	**40 Hrs**

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Course Title : Static and Dynamic Analysis using Altair Hyperworks	**Course Code :**19CC3221, 20CC0034
Category : Employability	**Level-3:** for Y19 and Y20 Batch of Students
Mode : Offline Teaching and CC Exam on Online	**Duration : 40 Hrs** (4 Hrs/Week x 10 Week)
Source: Certified and Trained Faculty from Department	
CC Outcome: Students will learn the procedure and techniques to Model, Mesh, apply load and boundary conditions and Solve to generate final results and graphs.	
Title of Global Certificate : Certification from Design Tech.	

SYLLABUS

S.No	Topic	Course Content	Duration in Hrs
1	**Introduction**	Importance of Hyper works and its advantages, Various modules in Altair Hyper works, Screen components, 7 Pages on the working screen, Various Tool Bars and its usage during analysis., About the various stages to analyze the given problem, Step by Step procedure to solve any problem, Listing and Plotting the results with Example	**16**
2	**Solving the given problems using Radioss Solver**	1. RD-1000: Linear Static Analysis of a Plate with a Hole 2. RD-1010: Thermal Stress Analysis of a Coffee Pot Lid 3. RD-1020: Normal Modes Analysis of a Splash Shield 5. RD-1040: 3-D Buckling Analysis using RADIOSS 6. RD-1110: Setting up a Modal Analysis 7. RD-2000: Frequency Response Analysis of a Flat Plate 8. RD-2020:Transient Dynamic Analysis of a Bracket	**16**
3	**Topology Optimization (Optistruct Solver)**	9. OS-2000: Design Concept for a Structural C-clip 10. OS-2005: Design Concept for a Structural C-clip with Minimum Member Size Control	**4**
4	**Advanced Topics**	Topography Optimization, Size Optimization, Shape Optimization with example	**4**
		Total Course Duration:	**40 Hrs**

Course Title : Introduction to Programming using Python	**Course Code :** 19CC3217, 20CC0031, 21CC0031
Category : Employability	**Level-2:** for Y19,Y20,Y21 Batch of Students
Mode : Offline Teaching and CC Exam on Online	**Duration : 40 Hrs** (4 Hrs/Week x 10 Week)

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Source: Certified and Trained Faculty from Department

CC Outcome: Students will be able to recognize and write syntactically correct Python code, recognize data types supported by Python, and be able to recognize and write Python code that will logically solve a given problem statement.

Title of Global Certificate : Microsoft Technology Associate-Python

SYLLABUS

S.No	Topic	Course Content	Duration in Hrs
1	Evaluate an expression to identify the data type Python will assign to each variable.	Data types include str, int, float, and bool	5
2	Convert between and work with data types.	Type casting; constructing data structures; indexing and slicing operations	5
3	Determine the sequence of execution based on operator precedence. Select the appropriate operator to achieve the intended result.	Assignment; Comparison; Logical; Arithmetic; Identity (is); Containment (in)	5
4	Construct and analyze code segments that use branching statements	if; elif; else; nested and compound conditionals	5
5	Construct and analyze code segments that perform iteration	while; for; break; continue; pass; nested loops and loops that include compound conditionals	5
6	Construct and analyze code segments that perform file input and output operations.	open; close; read; write; append; check existence; delete; with statement	4
7	Construct and analyze code segments that include function definitions.	Call signatures; default values; return; def; pass Syntax errors; logic errors; runtime errors	5
8	Solve complex computing problems by using built-in modules.	math; date time; io; sys; os; os.path; random	6
		Total Course Duration:	**40 Hrs**

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