

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING
ACTION TAKEN TOWARDS STAKE HOLDERS' FEEDBACK
ON THE CURRICULUM
2020-21

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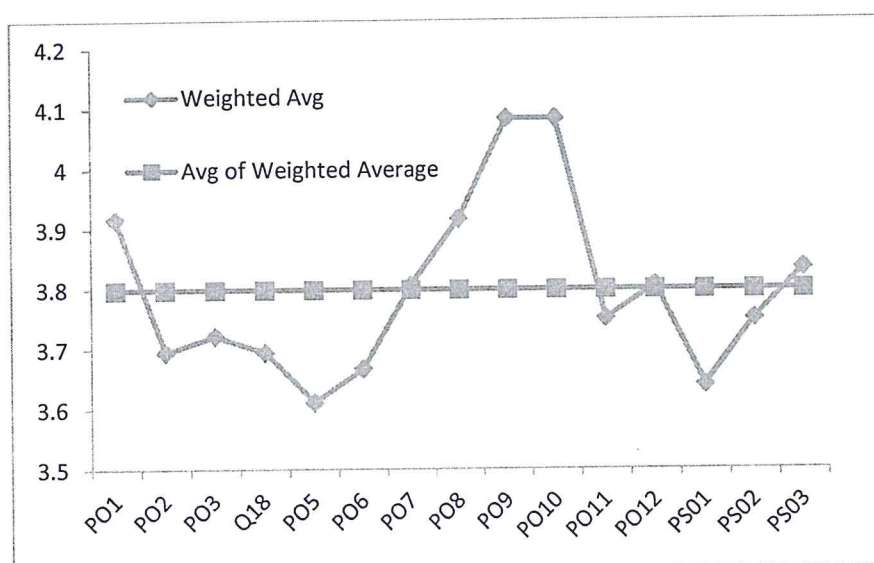
Department of Mechanical Engineering

Action taken Report on Student feedback (Programme exit survey) -2020-21

Note : The average value is taken as bench mark. The values above are taken satisfactory and the values below are to be improved

I. Achievement of POs: Average of Weighted average 3.798. The following POs are below the bench mark

PO2, PO3, PO4, PO5, PO6, PO11, PSO1, PSO2 : These POs correspond to technical knowledge. The root cause will be found out by discussion with the students and the corrective actions will be implemented.

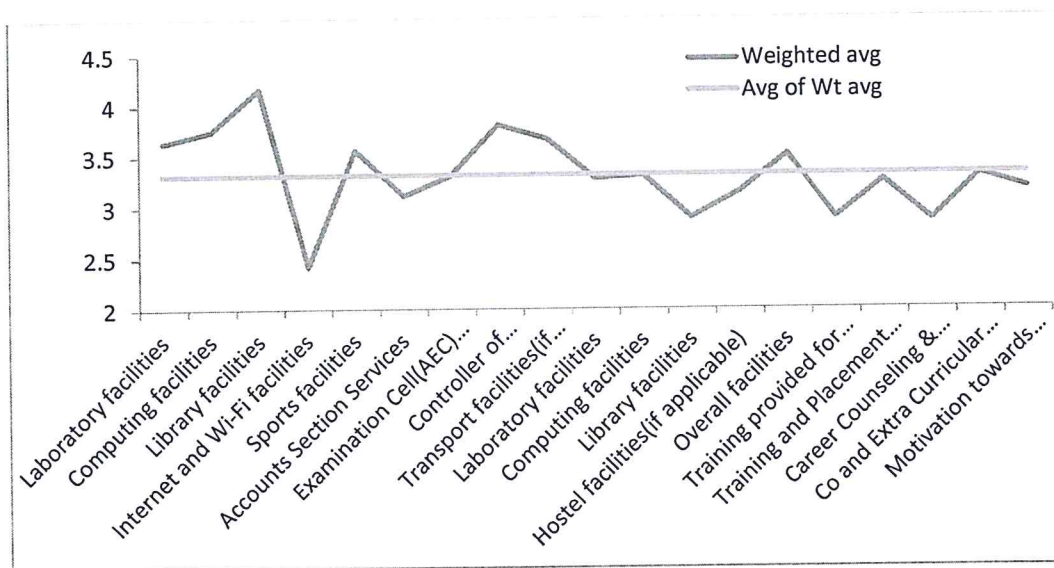


Common facilities : The bench mark is 3.315. the following are below the bench mark

1. Internet and Wi-Fi facilities: coverage in the campus has to be improved. There are many places in the college where wifi is not accessible. The same will be brought to the notice of higher authorities by the HoD through the proper channel (IQAC)
2. Accounts Section Services: there should be some body who can answer the student queries on phone. The same will be brought to the notice of higher authorities through the proper channel (IQAC)
3. Laboratory facilities: slightly less than the average. Head will find out cause and come out with what exactly is the deficiency and how to address the problem.


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3. Library facilities: issue of the books may be done after the college hours also. The feasibility will be discussed by the Head with the Librarian
4. Hostel facilities(if applicable): Food and cleanliness may be improved. The same will be brought to the notice of higher authorities by the HoD through the proper channel (IQAC)
5. Training provided for placements: Customised training for different companies may be planned. HoD will discuss the same with the training and placement and chalk out an action plan.
6. Training and Placement Office provided on/off campus placement opportunities: More companies may be contact and branding should be done. HoD will discuss the same with the training and placement and chalk out an action plan.
7. Career Counselling & Guidance for higher studies provided: short seminars may be conducted with different institutions providing different types of coaching. HoD will take the responsibility of the with permission of authorities
8. Motivation towards Research & Development(R&D): Students should be involved in R&D from second year onwards and the R&D center and the labs should be open for longer hours. The action plan for this is chalked in consultation with R&D cell



Specific Suggestion by the students:


S.No	Comments/Suggestions from the students	Corrective Action
1.	1. Good curriculum 2. Laboratory 3. Experienced faculty	---
2.	Experienced Faculty, Well equipped labs, Student friendly Approach, Better placements are needed	---
3.	1) Great teachings and meticulous information shared by some of the faculty members. 2) Great help received from faculty in doing research and project works. 3) Good environment for learning is created within the department. 1) Recruit teaching staff based on capability to explain the	12. the lab equipment up gradation is continuously being done 13. Training will


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	<p>students in an easier and understandable manner.</p> <p>2) Make all payments online, so that usage of bank in college hours be reduced.</p> <p>3) Try to enlarge the facilities and space area of store and xerox shop so that it wont be difficult for students to get basic needs quickly.</p> <p>4) More funds has to be allocated to students in innovation and competitive activities like GOkart.</p> <p>5) At least 3 hours of physical fitness has to be provided to the students.</p> <p>6) Arrange inter-colleges sports meet so that students can maintain their balance in departmental works.</p> <p>7) The time limit for carrying out the books in library has to be increased to 3 weeks at least.</p> <p>8) Maintain hygienic canteen and try to give the contract to authorities which can give best quality of food at reasonable price, quality of food has to be more focused than number of items of less quality .</p> <p>9)To transport department, Ask the drivers to drive slow at least at speed breakers, i'm the evident person who has suffered back pain for 2 months by impact created on back bone due to sudden jerks at speed breakers.</p> <p>10) Maintain open gate system from lunch onwards.</p> <p>11) Ask the AEC staff to be little polite to the students who come up to them for enquiry purposes.</p> <p>12) Equip the labs with better and accurate machines, especially in mechanical labs.</p> <p>13) Train the lab assistants in explaining the students about the machinery and functions related to it.</p> <p>14) Design student friendly time tables so that they wont be bored like continuous 6 hours of classes in a day is quite difficult to cope up with.</p> <p>15) Try to consider the students feedback taken in the mid course of every semester.</p> <p>16) Ask faculty to be student friendly. Many Faculty members are extra-ordinary and doing great in teaching but few are trying to play revenge tactics in external and internal lab examinations.</p> <p>17) Instead of allotting 10 marks on slip-test basis, allot the marks on weekly performance in research related works or on basis of student's extra circular activities in any mechanical related fields.</p> <p>18) Maintain the washrooms clean and provide water facility to each & every washroom in the campus.</p> <p>19) Make research papers more accessible to students.</p> <p>20) Educate students on nptel uses, and how to access them at the earliest possible time. Thank you.....!!!!</p>	<p>be provided to the lab technicians</p> <p>16. HoD will build the confidence in the students so that he will not be punished if problem is brought to notice.</p> <p>20. Awareness sessions will be conducted by the department.</p>
4.	<p>The sports resources currently available are not adequate enough for the number of students. Increasing the Sports resources might help.</p> <p>Campus placements for Mechanical branch are low. Increasing</p>	<p>HoD along with the team of professors will conduct a</p>

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	placement opportunities for students will improve our chances of getting placed.	meeting with Director CDC to come out with some action plan
5.	The department is well equipped with laboratories Most of the Faculty members have presented & Published papers at several national international journals The Department has highly motivated faculty with good academic experience. Laboratories should be upgraded. College Website and LMS portal should be improved.	Laboratories are continuously being updated with in the budget constraints
6.	Technically well rounded Rich Heritage Prosperous Alumni An initiation to connect students with alumni throughout the program is highly appreciated. A student body to better understand and cater to the grievances of students is appreciated. The student mentoring program can be initiated as early as during the first year. Partnering with industry bodies can provide students with abundant opportunities throughout their academic program to learn from industry experts.	The effort is being done by strengthening the counseling. In this process we try to re-establish the contacts with the Alumni
7.	1) Industrial Tour makes this program stand-out from the rest of the branches. 2) Highly intellectual and student-supporting staff. 3) Proper schedules and completion of tasks on time. Career guidance must be given to lead students into their suitable program/ job. Our/my only desire is to bring back the lenience the college had before. This helps the students to feel safe in a friendly-atmosphere, rather than like other institutions which make students feel locked-up in the college.	Regarding the removal of restrictions HoD will represent the same to higher authorities though proper channel such as IQAC etc.
8.	Effective technical skills team working problem solving To improve in infrastructure and minimize the restrictions in college.	--
9.	Excellent in mechanical engineering course	--
10.	Good in laboratory Equipments Need skilled lab technicians Need faculty intervention in Core Clubs like SAE CBIT & ASME CBIT(Kratos)	The technician should have minimum diploma from reputed polytechnics. While stating the requirements HoD has already presented the same to higher authorities
11.	Highly calibred professors	---


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Action taken report on Faculty Feedback

2020-21

S. No	Description	Action Taken/Proposed	Page Number
1	Mr Aditya TN suggested Projection of Solids inclined to both the planes to be included in CAD & Drafting	Based on the constraints of time it was not included	—
2	Mr Aditya TN suggested to include recent developments and techniques in NDT & Evaluation subject	Will be considered in next revision.	—
3.	Mr Aditya TN suggested to include Basics of Strength of Materials in Failure Analysis and Design Subject	As there is course strength of materials in III sem, it is felt that it is not required in failure analysis and design	—
4.	Ch.V.Sushma suggested to include Strain Energy for Axial, Torsional load and delete compound stresss in cylinders	Strain Energy for Axial, Torsional load is included and compound stresses in cylinders was deleted	8-9
5.	Dr. B.V.S. Rao suggested hybrid manufacturing basic concepts and challenges are to be included in MCMTE	It will be considered for next revision	—
6.	Dr. G. Laxmaiah machine drawing subject should be introduced	Machine drawing in introduced in R-20	10
7.	Dr. T. Ratna Reddy suggested Turbulence can be grouped as one unit in CFD subject	It is included as IV unit in CFD course	11-12
8.	Ch. Sharath Redy, suggested Electrical Vehicle may be included in Automobile engineering	It is included	13-14
9	Ms Indira Priya Darsini suggested to add data analysis topics in RM IPR	Included in the syllabus	15-16
10	Mr P Kiran Kumar suggested to reframe Course Outcomes (CO1 & CO2) in DME subject.	Done during the recent revision	17-18



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11	Ms Indira Priya Darsini suggested to MAT Lab and FVM topics can be increased in CFD	MATLAB is purchased by the institution. Hence will be included in next revision	—
12	Ms Indira Priya Darsini suggested to include wind turbine and bio gas plant design in RES.	Will be considered in next revision	—
13	Dr S .Narsimha Kumar suggests to include Wind Tunnel Experiment is also included.	Included in the syllabus	19-20
14	Dr R P Chowdary suggest to add concepts of radiation shields in ATD & HT	As syllabus is more, the topics are not included	—
15	Ms N. Jyothirmayi suggested removing topics related to types of business organization and management functions in Production Operations Management.	Deleted from the syllabus as is already there in Enterprenuership.	21-22
16	Mr Chandra Kanth suggested including Digital Manufacturing and Industry 4.0 Concept in CIM Subject.	Digital manufacturing is introduced as a separate course	23
17	Dr Aleem Pasha suggested adding Miller Indices and types of structures in Material Science and metallurgy.	Will considered in next revision	—
18	Dr Aleem Pasha suggested adding case studies and problems in research methodology.	Will considered in next revision	—



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CBIT (A)
20MEC05

With Effect from the Academic Year 2021-22

STRENGTH OF MATERIALS

Instruction	3 L+1T Hours per Week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Objectives:

1. Student is exposed to the concept of different types of loads, stresses, strains and analysis of members for axial loads.
2. Student will acquire knowledge in drawing bending and shear force diagrams of beams of various loads and configurations.
3. Student becomes familiar with methods of evaluation of deflection of beams of various configurations and stresses that arise due to simple bending.
4. Student is exposed to the concept of shear stresses in beams, principal stresses, strains and phenomenon of torsion.
5. Student will acquire knowledge in estimating stresses for thin, thick cylindrical shells and buckling of columns.

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

1. Determine stresses and strains in members subjected to axial loads and temperature changes.
2. Draw shear force, bending moment diagrams for different types of beams and calculate stresses and strains due to simple bending.
3. Determine slope and deflection for various configurations of beams using different methods, analyze stress, strain and deflection due to torsion in circular members.
4. Analyze shear stress distribution in different sections of beams and find out principal stresses and strains.
5. Find out stresses and strains in thin, thick cylindrical shells and able to calculate critical buckling loads in columns and struts.

UNIT -I

Stresses and Strains: Definitions, Types of stresses and strains, Elasticity and plasticity, Hooke's law, Stress-strain diagrams for engineering materials, Modulus of elasticity, Poisson's ratio, Relationship between elastic constants, Linear and volumetric strains, Bars of uniform strength, Temperature stresses, Compound bars, Strain energy for axial and torsional loads.

UNIT – II

Beams: Definition of shear force and bending moment, Relation between intensity of loading, Shear force and bending moment, Shear force and bending moment diagrams for cantilever, Simply supported and overhanging beams, Theory of simple bending, Moment of resistance and comparison of various cross-sections.

UNIT – III

Slopes and Deflections: Slope and deflection calculations of cantilever, Simply supported

beams subjected to point loads and uniformly distributed loads with Macaulay's and double integration methods.

Torsion of Circular Cross-sections: Theory of pure torsion, Power transmission in solid and hollow circular shafts, Combined bending and torsion.

UNIT – IV

Shear Stresses in Beams: Distribution of shear stresses in rectangular, I-section, T-section, Solid and hollow circular sections.

Principal Stresses and Strains: Analysis of biaxial state of stress with and without shear, Mohr's Circle.

UNIT – V

Cylinders: Stresses in thin and thick cylinders with internal and external pressures.

Columns and Struts: Euler's and Rankine's formulae for axial load applications. Secant and Perry formulae for eccentrically loaded columns.

Textbooks:

1. S.S. Rattan., Strength of Materials, 3rd edition, Tata Mc-Graw Hill, 2017.
2. Ferdinand P. Beer, E. Russell Johnston, John T. Dewolf and David F. Mazurek., Mechanics of Materials, 8th edition, McGraw-Hill, New York, 2020.

Suggested Reading:

3. James M Gere, Mechanics of materials, 8th edition, Cengage Learning, 2013.
4. R.C. Hibbeler, Mechanics of Materials, 9th edition, Pearson, 2018.
5. S. Ramamrutham., Strength of Materials, 16th edition, Dhanpatrai and Sons, 2011.

With effect from the academic year 2022-23

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Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VI**

S. No	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20MEC23	Metrology and Instrumentation	3	--	--	3	40	60	3
2	20MEC24	Machine Design	3	--	--	3	40	60	3
3	20MEC25	Thermal Turbo Machines	3	--	--	3	40	60	3
4	20MEC26	Finite Element Analysis	3	1	--	3	40	60	4
5		Professional Elective - III	3	--	--	3	40	60	3
PRACTICALS									
6	20MEC27	Metrology and Instrumentation Lab	--	--	2	3	50	50	1
7	20MEC28	Machine Drawing Lab	--	--	2	3	50	50	1
8	20MEC29	Production Drawing Lab	--	--	2	3	50	50	1
9	20MEC30	Thermal Engineering Lab	--	--	2	3	50	50	1
10	20MEC31	Finite Element Analysis Lab	--	--	2	3	50	50	1
11	20EGCO3	Employability Skills Lab	--	--	2	3	50	50	1
TOTAL			15	01	12	--	500	600	22

L: Lecture T: Tutorial D: Drawing P: Practical**CIE - Continuous Internal Evaluation SEE – Semester End ExaminationA**

Professional Elective – III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20MEE09	Computational Fluid Dynamics
2	20MEE10	Additive Manufacturing
3	20MEE11	Operations Research
4	20MEE12	Industrial Safety and Maintenance


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20MEE09

COMPUTATIONAL FLUID DYNAMICS

(Professional Elective-III)

Instruction	3	Hours per week
Duration of SEE	3	Hours
SEE	60	Marks
CIE	40	Marks
Credits	3	

Objectives:

1. To understand governing equations of fluid flow
2. To understand turbulence and how to model them.
3. To know how to discretize governing equations of fluid flow by FDM and their stability.
4. To learn various iterative methods to solve N-S equation.
5. To understand FVM to solve fluid flow equations.

Outcomes: At the end of the course, the students are able to

1. Describe and develop mathematical models for flow phenomena.
2. Apply Finite Difference Method for fluid flow and heat transfer problems Classify PDE for fluid flow and heat transfer applications.
3. Use different solvers based on applications
4. Solve fluid flow and heat transfer problems using commercial CFD tools for turbulence models
5. Formulate numerical equations by Finite Volume Method for fluid flow and heat transfer problems

UNIT-I

Governing Equations of Fluid Dynamics and Heat Transfer:

Introduction to CFD, Models of Flow – Conservation and Non-conservation form - Continuity, Momentum and Energy Equation in conservation and non-conservation form (differential equations only)

UNIT-II

Classifications of Partial Differential Equations: Elliptic, parabolic and hyperbolic equations, Initial and boundary value problems.

Discretization and Finite Difference method: Forward, Backward and Central difference schemes, Transient one and two dimensional conduction - Explicit, implicit, semi-implicit and ADI methods - Stability analysis and error estimation.

UNIT-III

Elliptic Partial Differential Equations: Jacobi, Gauss Seidel methods, TDMA,
Viscous incompressible flow, Vorticity Stream function method.

UNIT-IV

Turbulence Modeling:

Types of Turbulence modeling-Reynolds and Favre averaged N-S equations, mixing length model, k-epsilon turbulence model.


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UNIT-V


Finite Volume Method: Finite volume formulation for diffusion equation, convection diffusion equation, Solution algorithm for pressure velocity coupling in steady flows, staggered grid, SIMPLE algorithm.

Text Books:

1. P.S. Ghoshdastidar, Computational Fluid Dynamics & Heat Transfer, Cengage Pub., 2018.
2. J.D. Anderson, Jr., Computational Fluid Dynamics: The Basic with Applications, McGraw Hill, Inc., 2012.
3. H. Versteeg and W. Malalasekera, An Introduction to Computational Fluid Dynamics : The Finite Volume Method, 3rd edition, Pearson, , 2016

Suggested Reading:

1. F. John Wendt (Editor), Computational Fluid Dynamics - An Introduction, Springer – Verlag, Berlin, 1992.
2. Charles Hirsch, Numerical Computation of Internal and External Flows, Vols. I and II. John Wiley & Sons, New York, 1988.


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With effect from the academic year 2023-24

20MEE13

AUTOMOBILE ENGINEERING
(Professional Elective-IV)

Instruction	3	Hours per week
Duration of SEE	3	Hours
SEE	60	Marks
CIE	40	Marks
Credits	3	

Objectives:

1. To learn about the layout and arrangement of principal parts of an automobile.
2. To understand working of different types of Drive train and Transmission Systems
3. To learn about different types of Steering, Axle, Wheels and Tyres.
4. To understand different types of Suspension and braking systems.
5. To learn about Alternative Energy Sources for Automobiles.

Outcomes: Student will be able to:

1. Identify principal parts of an automobile and its layout.
2. Understand the various systems in automobile like engine cooling, lubrication, ignition, electrical and air conditioning systems with the principles of thermodynamics.
3. Understand the various suspension and steering systems.
4. Analyse the functioning of drive train, transmission and braking systems.
5. Understand the importance of alternative power trains for pollution control.

UNIT - I

Engine: Engine location and its components, chassis layout - parts of the automobile body, terminology, automobile frames ; crank shaft, firing order, piston and piston rings, cylinder liners, valves and operation mechanism, VVT , Carburetion, GDI Engines, MPFI, Compression Ignition engines - Fuel Injection System and Electronic Fuel Injection system

Maintenance: Trouble shooting and overhauling, engine tune up

UNIT - II

Lubricating Systems: Wet sump, dry sump and petrol systems

Cooling systems: Water pumps, radiators, thermostat control, anti-freezing compounds

Ignition Systems: Ignition Systems – Battery, Magneto and Electronic Ignition Systems.

Electrical Systems : Main electrical circuits, Batteries and charging systems, Starting circuit, lighting system, indicating devices, warning lights, speedometer, automobile air-conditioning

UNIT - III

Wheel and tyres: Tyre construction, specification, Tyre wear and causes.

Suspension systems: Types of Suspension systems, Independent suspension, coil and leaf springs, torsion bar, shock absorbers


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Steering Systems: Linkage arrangements and its components, steering gear box types, Electronic power steering system, Davis & Ackerman Steering, Steering geometry: caster, camber, King Pin Inclination, Toe in, toe out, wheel balancing, wheel alignment

UNIT – IV

Power Train: Clutches – Single plate & Multiplate clutches, Gearbox – Manual, and automatic gearboxes. Torque converter, propeller shaft, universal coupling, differential, four-wheel drive system

Brakes Systems: Disc and Drum Brakes, Description and operation of hydraulic brake, hand brake linkage, ABS, EBD

UNIT – V

Pollution control: Pollution control techniques used for petrol and diesel engines, PCVS, EGR, SCRT, Thermal Reactors, Catalytic converters; Euro norms and Bharat Norms.

Alternative Power Trains: Electric Vehicles, Hybrid Vehicles, Batteries used in Electric and Hybrid Vehicles, Battery charging systems. Fuel cell Vehicles – Introduction

Text Books:

1. R. K. Rajput, A Textbook of Automobile Engineering, 2nd edition, Laxmi Publications Pvt Ltd, 2007
2. Kirpal Singh, Automobile Engineering, Vol I and II”, 12th edition, Standard Publishers, 2011
3. P.L. Kohli, Automotive Electrical Equipment, Tata McGraw Hill, 1985.

Suggested Reading:

1. S. Srinivasan, Automotive Mechanics, 2nd edition, Tata Mc Graw Hill, 2003
2. William H. Crouse, Donald L. Anglin, “Automotive Mechanics”, 10th edition, Tata Mc Graw Hill, 2007.

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20ME M103**RESEARCH METHODOLOGY AND IPR**

Instruction	2 Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	2

Objectives: To make the students to

1. Motivate to choose research as career
2. Formulate the research problem, prepare the research design
3. Identify various sources for literature review and data collection report writing
4. Equip with good methods to analyze the collected data
5. Know about IPR copyrights

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

1. Define research problem, review and assess the quality of literature from various sources
2. Improve the style and format of writing a report for technical paper/ Journal report, understand and develop various research designs
3. Collect the data by various methods: observation, interview, questionnaires
4. Analyze problem by statistical techniques: ANOVA, F-test, Chi-square
5. Understand apply for patent and copyrights

UNIT - I

Research Methodology: Research Methodology: Objectives and Motivation of Research, Types of Research, research approaches, Significance of Research, Research Methods versus Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general. Defining the Research Problem: Selection of Research Problem, Necessity of Defining the Problem

UNIT - II

Literature Survey Report Writing: Literature Survey: Importance and purpose of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet. Report writing: Meaning of interpretation, layout of research report, Types of reports, Mechanics of writing

a report. Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal

UNIT- III

Research Design: Research Design: Meaning of Research Design, Need of Research Design, Feature of a Good Design, Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, Developing a Research Plan, Steps in sample design, types of sample designs.

UNIT - IV

Data Collection and Analysis: Data Collection: Methods of data collection, importance of Parametric, non parametric test, testing of variance of two normal population, use of Chi-square, ANOVA, Ftest, z-test

UNIT - V

Patents and Copy Right: Patent: Macro economic impact of the patent system, Patent document, How to protect your inventions. Granting of patent, Rights of a patent, how extensive is patent protection. Copyright: What is copyright. What is covered by copyright. How long does copyright last? Why protect copyright? Related Rights: what are related rights? Enforcement of Intellectual Property Rights: Infringement of intellectual property rights, Case studies of patents and IP Protection

Text Books:

1. C. R. Kothari, "Research Methodology, Methods & Technique", New Age International Publishers, 2004.
2. R. Ganesan, "Research Methodology for Engineers", MJ Publishers, 2011.
3. Y. P. Agarwal, "Statistical Methods: Concepts, Application and Computation", Sterling Publs., Pvt., Ltd., New Delhi, 2004.

Suggested Reading:

1. Ajit Parulekar and Sarita D' Souza, "Indian Patents Law – Legal & Business Implications", Macmillan India ltd, 2006
2. B. L. Wadehra, "Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications", Universal law Publishing Pvt. Ltd., India 2000.
3. P. Narayanan, "Law of Copyright and Industrial Designs", Eastern law House, Delhi 2010.

With Effect from academic year 2022-2023

20ME C18

DESIGN OF MACHINE ELEMENTS
(Use of data book is permitted)

Instruction	3 L + 1T	Hours per week
Duration of SEE	3	Hours
SEE	60	Marks
CIE	40	Marks
Credits	4	

Objectives:

1. To understand the principles of machine design and design of components for static loads.
2. To design machine members for fluctuating loads and impact loads
3. Learn the design principles of shafts, keys, couplings, belt drives and pulleys.
4. Understand the principles of design of permanent joints such as riveted and welded joints.
5. Understand the principles of design of bolted joints, power screws and gasket joints.

Outcomes: At the end of the course, students are able to

1. Understand the standards, codes, various design considerations, failure criteria of members and design for static loads.
2. Design machine members subjected to fluctuating and impact loads.
3. Recommend suitable shafts, couplings and belt drives for a given application.
4. Design and suggest permanent joints for a given application.
5. Design of temporary fasteners.

UNIT – I

Introduction: Materials used in machine components and their specifications to Indian standards. Codes and standards used in design. Reliability, Principles of Ergonomics and Manufacturing considerations, preferred numbers, Types of loads and corresponding stresses. Theories of elastic failure, Stress concentration factor, factor of safety, Design of components for static loads.

UNIT – II

Design for Fatigue and Impact loads: Importance of fatigue in design, Fluctuating stresses, fatigue strength and endurance limit. Factors affecting fatigue strength. S-N Diagram, Soderberg and Modified Goodman's diagrams for fatigue design. Cumulative fatigue, Miner's rule, Design of components for fatigue. Design of components for impact loading.

UNIT - III

Design of shafts: Solid, hollow and splined shafts under torsion and bending loads.

Design of Keys & Couplings: Keys, Muff and Split muff Couplings, Flange, Flexible and Marine type of couplings.

Design of Belt Drive Systems: selection of belts and design of pulleys.

UNIT – IV

Design of Riveted Joints: Types of riveted joints, efficiency of the joint. Design of joints subjected to direct and eccentric loads.

Welded Joints: Types of joints, Design of welded joints subjected to direct and eccentric loading

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UNIT – V

Design of temporary fasteners: Cotter and knuckle joints. Design of bolts and nuts. Locking devices, bolt of uniform strength. design of gasket joints, Design of power screws and screw jack.

Text Books:

- 1 V.B. Bhandari, Design Machine Elements, McGraw Hill Publication, 2017.
- 2 J.E. Shigley, C.R. Mischne, Mechanical Engineering Design, Tata McGraw Hill Publications, 2015.
- 3 R.S.Khurmi and J.K.Gupta, Machine design, 34th edition, S Chand publications, 2018.

Suggested Reading:

- 1 Robert L. Norton, Machine Design: An Integrated Approach, 2nd edition, Pearson Education, 2013
- 2 P. Kanniah, Machine Design, Science-Tech Publications, 2010
- 3 M.F. Spotts, Design of Machine Elements, Prentice Hall of India, 2013.

Machine Design Data Books:

- 1 K. Mahadevan, K. Balaveera Reddy., Design Data Hand book for Mechanical Engineers, 3rd edition, CBSPublisher,
- 2 PSG College, Design Data book, 2012
- 3 V.B. Bhandari, Machine Design Data Book, McGraw Hill Education, 2015


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20MEC30

THERMAL ENGINEERING LAB

Instruction	2	Hours per week
Duration of SEE	3	Hours
SEE	50	Marks
CIE	50	Marks
Credits	1	

Objectives:

1. To demonstrate knowledge in evaluating thermal conductivity of a metal rod and critical heat flux of a material.
2. To know about the phase change heat transfer and performance of cross flow heat exchanger.
3. To understand the working of principle of axial flow fan and centrifugal blower.
4. To evaluate the COP of Refrigeration tutor and AC tutor.
5. To determine the pressure distribution in nozzle; drag and lift coefficients for contoured bodies.

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

1. Determine thermal conductivity of a metal rod and critical heat flux of a copper wire.
2. Estimate the convective heat transfer coefficients for phase change heat transfer and effectiveness of cross flow heat exchanger.
3. Determine the overall efficiency of centrifugal/axial-flow compressor.
4. Study of COP of refrigeration/air conditioning tutor.
5. Determine the - pressure distribution in a nozzle/cylinder/aero-foil; lift and drag forces for different geometrical profiles.

List of the Experiments

1. Study of Thermal conductivity of metal rod.
2. Determination of critical heat flux for copper wire in water.
3. Evaluate the convective heat transfer coefficient of dropwise and filmwise condensation.
4. Evaluate the effectiveness of cross flow heat exchanger.
5. Determination of overall efficiency of centrifugal blower
6. Study of overall efficiency of axial flow fan
7. Study of COP of refrigerating tutor
8. Study of COP of air conditioning tutor
9. Determination of pressure distribution for convergent and divergent nozzle
10. Determination of pressure distribution for a cylinder
11. Determination of pressure distribution for an aerofoil.
12. Determination of lift and drag coefficient for different contours
13. Determination of Sensible and Latent heat loads for a class room and validating the data with RAC software.

Note: Student should complete a minimum of 10 experiments including experiment number 13 which is compulsory.

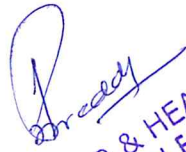
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Text Books:

1. S M Yahya, Fundamentals of Compressible Flow, New Age International Publishers, 2014.
2. Mahesh M. Rathore, Thermal Engineering, TMH, New Delhi, 2010
3. M L Mathur & F S Mehta, Thermal Engineering, Jain Brothers, New Delhi, 2014

Suggested Reading:

1. V. Ganeshan, Gas Turbines, Tata Mc Graw Hills, New Delhi, 2010.
2. R.K. Rajput, Heat Transfer, Laxmi Publication, 2014



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CBIT (A)
20MEE03

With Effect from the Academic Year 2021-22

ENTREPRENEURSHIP
(Professional Elective - I)

Instruction	3 L Hours per Week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Objectives:

1. Concept and procedure of idea generation.
2. The nature of industry and related opportunities and challenges.
3. Elements of business plan and its procedure.
4. Project management and its techniques.
5. Behavioural issues and Time management.

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

1. Understand the concept and essence of entrepreneurship.
2. Identify business opportunities and nature of enterprise.
3. Analyze the feasibility of new business plan.
4. Apply project management techniques like PERT and CPM for effective planning and execution of projects.
5. Use behavioral, leadership and time management aspects in entrepreneurial journey.

UNIT-I

Entrepreneurship: Definition, Functions of entrepreneurs, Qualities of entrepreneurs, Entrepreneur vs intrapreneur, First generation entrepreneurs, Women entrepreneurs, Innovation, Creativity, Intellectual property in entrepreneurial journey, Conception and evaluation of ideas and their sources, Need and importance of startups and incubation centers.

UNIT-II

Indian Industrial Environment: Competence, Opportunities and challenges, Entrepreneurship and economic growth, Small scale industry in India, Objectives, Linkage among small, medium and large scale industries, Types of enterprises, Corporate social responsibility.

UNIT-III

Formulation of Business Plan: Introduction, Business model canvas, **Elements of business plan and its salient features**, Technical analysis, Profitability and financial analysis, Marketing analysis, Executive summary. Choice of technology and collaborative interactions, Sources of finance and Incentives for entrepreneurs. Business firm registration procedures.

UNIT-IV

Project Management: Meaning and definition of project, Project organization, Project planning, Execution and control using CPM and PERT techniques, Human aspects of project management, Assessment of tax burden, Environmental issues.


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UNIT-V

Behavioral Aspects of Entrepreneurs: Personality determinants, Maslow's hierarchy of needs, Leadership concepts and models, Values and attitudes, Motivation aspects, Change behavior.

Time Management: Approaches of time management, Strengths and weaknesses, Time management matrix and the urgency addiction

Text Books:

1. Vasant Desai., Dynamics of Entrepreneurial Development and Management, 6th edition, Himalaya Publishing House, Mumbai, 1997.
2. Prasanna Chandra., Projects: Planning, Analysis, Selection, Implementation and Review, 8th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1995.

Suggested Reading:

1. Robert D. Hisrich and Michael P. Peters., Entrepreneurship, 5th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2005.
2. Stephen R. Covey., First Things First, 1st edition, Free press, New York, 2003.
3. S.S. Khanka., Entrepreneurial Development, 4th edition, S. Chand & Co. Pvt. Ltd., New Delhi, 2012.


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With effect from the academic year 2023-24

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VII**

S. No.	Course Code	Title of the Course	Scheme of instruction			Scheme of Examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1		Professional Elective - IV	3	--	--	3	40	60	3
2		Professional Elective - V	3	--	--	3	40	60	3
3		Open Elective - II	3	--	--	3	40	60	3
4		Open Elective – III	3	--	--	3	40	60	3
5	20EGM04	Gender Sensitization	2	--	--	2	--	50	*Non Credit
6	20MBC01	Engineering Economics and Accountancy	3	--	--	3	40	60	3
PRACTICALS									
7	20MEC33	Project Part-1	--	--	4	--	50	--	2
		Internship	4-6 Weeks/ 180 hours						3
TOTAL			17	--	04	--	250	350	17+3

L: Lecture T: Tutorial

D: Drawing P: Practical

CIE - Continuous Internal Evaluation

SEE – Semester End Examination

Professional Elective – IV (3/3)			Professional Elective – V (3/3)		
S.No.	Subject Code	Name of the Subject	S. No.	Subject Code	Name of the Subject
1	20MEE13	Automobile Engineering	1	20ME E17	Renewable Energy Sources
2	20MEE14	Control System Theory	2	20ME E18	Digital Manufacturing and Industry 4.0
3	20MEE15	Mechanical Vibrations	3	20ME E19	Composite Materials and Testing
4	20MEE16	Supply Chain Management	4	20ME E20	Block Chain Technology

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Action taken report on Alumni, Recruiters and Industry feedback

2020-21

S. No	Description	Action Taken/Proposed	Page No
1	Maximum respondents rated performance POs & PSOs as good	-	-
2	Mr Prudhvijay suggested software like Ansys	Ansys is part of curriculum	26-27
3.	An Alumni suggested to emphasize more on designing and simulation software	CAD/CAM lab, FEA lab are there in curriculum in which a hands practice is being provided in softwares like Solid Works, ANSYS etc. In R-18 CAD & D Lab was introduced which gives exposure to AUTOCAD. From R20 Production drawing and Machine drawing labs are planned with Auto CAD.	28-31
4.	An Alumni suggested to provide more practical input on renewable energy sources and systems. Another alumni also felt the requirement of courses on sustainable and clean energy.	Renewable energy course is existing incurriculum. For facilitating in doing projects equipment related to solar and wind power is procured.	32
5.	Mr. Mirja Ismail suggest to have course on finance and cost control	The course Industrial Administration and Financial Management was introduced as an elective in R-18 curriculum and changed	32-33
6.	Mr Deepak Sai Sushanth suggested to introduce the course Entrepreneurship	to EEA in R-20 curriculum. Entrepreneurship is there in curriculum.	34-35
7.	Mr. PVS Srikar suggested to introduce Rapid Prototyping in curriculum	Introduced as Additive Manufacturing	36
8.	Mr. Anirudh proposed semester long internships.	Semester long internships are permitted in VII & VIII sem subjected to certain conditions.	37
9.	Mr. Madhav B opined that C++ can be replaced with MATLAB, CFD can include simulation tools (Internal project), AM can include design for AM, Internal Project: Design and Manufacturing using polymer (simplify 3D and Magics softwares), CAD/CAM Lab can be updated with different models, Research Methodology can include stational tools (JMP or Minitab), Java can be replaced with python, History of science and technology can be replaced with Quality management or lean management., gender sensitization can be replaced with introduction to data science or machine learning. Additional subjects: Safety Engineering, Physocology/Sociology/Anthropology	MATLAB is procured and made available for the students even on their personal computers. Design for additive Manufacturing is included in the course Additive Manufacturing. Python is introduced in the first sem itself. Industrial safety is introduced as an elective course.	38-43

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S. No	Description	Action Taken/Proposed	Page No
10.	Mr. Srujeeth Khanna, suggested requirement knowledge of programming with Python or MATLAB in mechanical applications, so it would be great to have these topics be introduced in parallel with a course. It would be good to be introduced with course like Machine Design Design of machine elements as these course required more calculations and development oriented.	MATLAB is procured and made available for the students even on their personal computers.	—
11	Mr. Sai Pranay, suggested the emphasise on which is the inclusion of GD&T as a subject in the curriculum he I felt that the manufacturing/design of components revolve around the knowledge of datums and tolerances.	Production drawing lab is reintroduced in R-20 which contain GD&T	31,44
12	Ms Sirisha, working BHEL suggested the Interdisciplinary courses which involve Mutlipysics and multiple domains need to be incorporated. Emerging trends such as Cyber Physical Systems., IoT, data analytics, etc., on Mechanical systems/ products needs to be put focus on. Courses on Industry 4.0 can also be explored. Suggest the training programmes/certifications Courses on Coursersa/Udemy/EdX/UpGrad can be explored. Hands on training on programming, CFD, Structureal Analysis, modeling softwares, analytical tools can be incorporated, workshops may be conducted. Certifications on Energy auditor, quality methods, and project management can be made aware of.	IoT, data analytics, Industry 4.0 are introduced in the curriculum. Two value added courses namely CFD applications in aerospace and MAT LAB for Engineers were introduced in the current semester	45-46


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With Effect from the Academic Year 2022 – 23

20MEC31

FINITE ELEMENT ANALYSIS LAB

Instruction	2	Hours per week
Duration of SEE	3	Hours
SEE	50	Marks
CIE	50	Marks
Credits	1	

Objectives:

1. Trusses , Bars of constant cross section area, tapered cross section area and stepped bar.
2. Beams -Simply supported, cantilever, beams with UDL, and beams with varying load etc.
3. Stress analysis of a rectangular plate with a circular hole, axisymmetric problems.
4. Buckling analysis and Dynamic Analysis.
5. Steady state and Transient heat transfer analysis.

Outcomes: At the end of the course, the students are able to

1. Apply basics of Theory of Elasticity to continuum problems.
2. Analyze finite elements like 1D, 2D and 3D structures for linear static analysis.
3. Solve heat transfer problems.
4. Examine problems of limited complexity in buckling and dynamic analysis.
5. Evaluate solutions to practical problems by finite element software.

List of Exercises:

1. Analysis of plane truss & special truss with various cross sections and materials.
2. 2D & 3D beam analysis with different sections, different materials for different loads
3. Static analysis of plate with a hole.
4. Plane stress, plane strain and axisymmetric loading on the in plane members.
5. Static analysis of connecting rod with tetrahedron and brick elements.
6. Static analysis of flat and curved shell due to internal pressure.
7. Buckling analysis of plates, shells and beams to estimate BF and modes.
8. Modal analysis of beams, plates and shells for natural frequencies and mode shapes.
9. Harmonic analysis of a shaft and transient analysis of plate.
10. Steady state heat transfer analysis of chimney and transient analysis of casting.
11. Non linear analysis of cantilever beam.
12. Coupled field analysis.
13. Static/Buckling/Modal/Harmonic/Transient/Non-Linear/ heat transfer analysis of a selected component.

Note:

1. Students should complete a minimum of 10 exercises including exercise number 13 which is compulsory.
2. Students may use any or combination of FEA software (ANSYS/ABAQUS/NASTRAN/NISA/CAEFEM/ADINA).

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Suggested Reading:

1. Tadeusz, A. Stolarski, Y. Nakasone, S. Yoshimoto, Engineering Analysis with ANSYS Software, 1st edition, Elsevier Butterworth-Heinemann publications, 2007.
2. ANSYS Inc., User Manuals for Release 15.0.


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With Effect from the Academic Year 2022 – 23

20ME C22**CAD/CAM LAB**

Instruction	2	Hours per week
Duration of SEE	3	Hours
SEE	50	Marks
CIE	50	Marks
Credits	1	

Objectives:

1. To teach the basic design process and the importance and types of geometric modeling techniques
2. To teach Assembly modelling by applying suitable assembly constraints
3. To generate orthographic views of components and assemblies.
4. To demonstrate the Indication of size, form, and positional tolerances on the drawing sheets
5. To demonstrate the working of CNC machines and write part programs for different operations

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

1. Make use of appropriate features to generate 3D model using CAD software
2. Apply constraints to assemble the components
3. Demonstrate the knowledge splines and surface modelling
4. Select tools required for performing specific job on CNC mill and CNC lathe
5. Write CNC part program to generate tool path for different machining operations

List of the Exercises:

1. Introduction and Working with Splines
2. Surface Modeling
3. Part modeling of simple parts using various features
4. Assembly of simple machine components (couplings)
5. Implementation of Geometric Transformations and Bezier curves using MATLAB
6. Contouring on CNC Milling Machine
7. Rectangular Pocketing and Circular Pocketing on CNC Milling Machine
8. Step Turning on CNC Lathe Machine and Taper Turning on CNC Lathe Machine
9. Multiple Turning on CNC Lathe Machine
10. Generation of STL files , Part orientation, support and Tool path generation using any RP software
11. Demonstration of FDM technology using 3D printer.
12. Develop a product using 3D Printing / generate CNC toolpath for its component it

Note: Student should complete a minimum of 10 exercises including exercise number 14 which is compulsory.

Text books:

1. P.N.Rao, -CAD/CAM:Principles and Application, TataMcGraw-Hill,July2017
2. N Mehta,-MachineToolDesign and NumericalControl, McGrawHillEducation, 3rd edition, 2017
3. DassaultSystems,-**SOLIDWORKS** Essentials:Training, SolidWorkscorp., 2011

Suggested Reading:

1. https://my.solidworks.com/solidworks/guide/SOLIDWORKS_Introduction_EN.pdf
2. <https://help.solidworks.com>


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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)

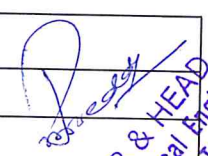
SEMESTER – VI

S. No	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20MEC23	Metrology and Instrumentation	3	--	--	3	40	60	3
2	20MEC24	Machine Design	3	--	--	3	40	60	3
3	20MEC25	Thermal Turbo Machines	3	--	--	3	40	60	3
4	20MEC26	Finite Element Analysis	3	1	--	3	40	60	4
5		Professional Elective - III	3	--	--	3	40	60	3
PRACTICALS									
6	20MEC27	Metrology and Instrumentation Lab	--	--	2	3	50	50	1
7	20MEC28	Machine Drawing Lab	--	--	2	3	50	50	1
8	20MEC29	Production Drawing Lab	--	--	2	3	50	50	1
9	20MEC30	Thermal Engineering Lab	--	--	2	3	50	50	1
10	20MEC31	Finite Element Analysis Lab	--	--	2	3	50	50	1
11	20EGCO3	Employability Skills Lab	--	--	2	3	50	50	1
TOTAL			15	01	12	--	500	600	22

L: Lecture T: Tutorial D: Drawing P: Practical

CIE - Continuous Internal Evaluation SEE – Semester End Examination

Professional Elective – III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20MEE09	Computational Fluid Dynamics
2	20MEE10	Additive Manufacturing
3	20MEE11	Operations Research
4	20MEE12	Industrial Safety and Maintenance


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with effect from the Academic Year 2020-21

20ME C01

CAD AND DRAFTING

Instruction	1 T + 3 D Hours per week
Duration of SEE	3Hours
SEE	50Marks
CIE	50Marks
Credits	2.5

Course Objectives:

1. To get exposure to a cad package and its utility.
2. Understanding orthographic projections.
3. To visualize different solids and their sections in orthographic projection
4. To prepare the student to communicate effectively by using isometric projection.
5. To prepare the student to use the techniques, skills, and modern tools necessary for practice.

Outcomes: At the end of the course, the Students are able to

1. Become conversant with appropriate use of CAD software for drafting. (BL-3)
2. Recognize BIS, ISO Standards and conventions in Engineering Drafting. (BL-2)
3. Construct the projections of points, lines, planes, solids (BL-3)
4. Analyse the internal details of solids through sectional views (BL-4)
5. Create an isometric projections and views (BL-6)

List of Exercises:

1. Introduction to CAD package: Settings, draw, modify tools, dimensioning and documentation
2. Construction of Conic Sections by General method
3. Orthographic projection: Principles, conventions, Projection of points
4. Projection of straight lines: Simple position, inclined to one plane
5. Projection of straight lines inclined to both the planes (without traces and mid-point)
6. Projection of planes: Perpendicular planes
7. Projection of planes: Oblique planes
8. Projection of solids: Simple position
9. Projection of solids: Inclined to one plane
10. Sections of solids: Prism, pyramid in simple position
11. Sections of solids: Cone and cylinder in simple position
12. Isometric projections and views
13. Conversion of isometric views to orthographic projections and vice versa.

Text Books:

1. N.D.Bhatt, "Elementary Engineering Drawing", Charotar Publishers, 2012.
2. K.Venugopal, "Engineering Drawing and Graphics + AutoCAD", New Age International Pvt. Ltd,2011.
3. Basanth Agrawal and C M Agrawal, "Engineering Drawing", 2/e, McGraw-Hill Education (India) Pvt. Ltd.

Suggested Reading:

1. Shaw M.B and Rana B.C., "Engineering Drawing", 2/e, Pearson, 2009.
2. K.L. Narayana and P.K. Kannaiah, "Text Book of Engineering Drawing", Scitech Publications, 2011.


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With effect from the academic year 2022-23

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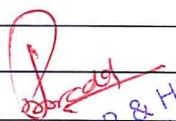
Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VI**

S. No	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20MEC23	Metrology and Instrumentation	3	--	--	3	40	60	3
2	20MEC24	Machine Design	3	--	--	3	40	60	3
3	20MEC25	Thermal Turbo Machines	3	--	--	3	40	60	3
4	20MEC26	Finite Element Analysis	3	1	--	3	40	60	4
5		Professional Elective - III	3	--	--	3	40	60	3
PRACTICALS									
6	20MEC27	Metrology and Instrumentation Lab	--	--	2	3	50	50	1
7	20MEC28	Machine Drawing Lab	--	--	2	3	50	50	1
8	20MEC29	Production Drawing Lab	--	--	2	3	50	50	1
9	20MEC30	Thermal Engineering Lab	--	--	2	3	50	50	1
10	20MEC31	Finite Element Analysis Lab	--	--	2	3	50	50	1
11	20EGCO3	Employability Skills Lab	--	--	2	3	50	50	1
TOTAL			15	01	12	--	500	600	22

L: Lecture T: Tutorial D: Drawing P: Practical**CIE - Continuous Internal Evaluation SEE – Semester End ExaminationA**

Professional Elective – III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20MEE09	Computational Fluid Dynamics
2	20MEE10	Additive Manufacturing
3	20MEE11	Operations Research
4	20MEE12	Industrial Safety and Maintenance


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With effect from the academic year 2023-24

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VII**

S. No	Course Code	Title of the Course	Scheme of instruction			Scheme of Examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1		Professional Elective - IV	3	--	--	3	40	60	3
2		Professional Elective - V	3	--	--	3	40	60	3
3		Open Elective - II	3	--	--	3	40	60	3
4		Open Elective – III	3	--	--	3	40	60	3
5	20EGM04	Gender Sensitization	2	--	--	2	--	50	*Non Credit
6	20MBC01	Engineering Economics and Accountancy	3	--	--	3	40	60	3
PRACTICALS									
7	20MEC33	Project Part-1	--	--	4	--	50	--	2
		Internship	4-6 Weeks/ 180 hours						3
TOTAL			17	--	04	--	250	350	17+3

L: Lecture T: Tutorial

D: Drawing P: Practical

CIE - Continuous Internal Evaluation

SEE – Semester End Examination

Professional Elective – IV (3/3)			Professional Elective – V (3/3)		
S.No.	Subject Code	Name of the Subject	S. No.	Subject Code	Name of the Subject
1	20MEE13	Automobile Engineering	1	20ME E17	Renewable Energy Sources
2	20MEE14	Control System Theory	2	20ME E18	Digital Manufacturing and Industry 4.0
3	20MEE15	Mechanical Vibrations	3	20ME E19	Composite Materials and Testing
4	20MEE16	Supply Chain Management	4	20ME E20	Block Chain Technology

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With Effect from the Academic Year 2023 – 24

20MBC01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3	Hours per week
Duration of SEE	3	Hours
SEE	60	Marks
CIE	40	Marks
Credits	3	

Course Objectives: The Objectives of the Course are:

1. To demonstrate the importance of Managerial Economics in Decision Making.
2. To explain the concept of Accountancy and provide basic knowledge on preparation of Final accounts.
3. To understand the importance of Project Evaluation in achieving a firm's Objective.

Course Outcomes: After Completion of the Course, Student will be able to:

1. Apply fundamental knowledge of Managerial Economics concepts and tools.
2. Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
3. Understand Production and Cost relationships to make best use of resources available.
4. Apply Accountancy Concepts and Conventions and preparation of Final Accounts.
5. Evaluate Capital and Capital Budgeting decision based on any technique.

Unit-I Introduction to Managerial Economics

Introduction to Economics and its evolution - Managerial Economics - its Nature and Scope, Importance; Relationship with other Subjects. Its usefulness to Engineers; Basic concepts of Managerial economics - Incremental, Time perspective, Discounting Principle, Opportunity Cost, Equimarginal Principle, Contribution, Negotiation Principle.

Unit-II Demand and Supply Analysis

Demand Analysis - Concept of Demand, Determinants, Law of demand - Assumptions and Exceptions; Elasticity of demand - Price, Income and Cross elasticity - simple numerical problems; Concept of Supply - Determinants of Supply, Law of Supply; Demand Forecasting - Methods.

Unit-III Production and Cost Analysis

Theory of Production - Production function - Isoquants and Isocosts, MRTS, Input-Output Relations; Laws of returns; Internal and External Economies of Scale.

Cost Analysis: Cost concepts – Types of Costs, Cost-Output Relationship – Short Run and Long Run; Market structures – Types of Competition, Features, Price Output Determination under Perfect Competition, Monopoly and Monopolistic Competition; Break-even Analysis – Concepts, Assumptions, Limitations, Numerical problems.

CBIT (A)
20MEE03

With Effect from the Academic Year 2021-22

ENTREPRENEURSHIP
(Professional Elective - I)

Instruction	3 L Hours per Week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Objectives:

1. Concept and procedure of idea generation.
2. The nature of industry and related opportunities and challenges.
3. Elements of business plan and its procedure.
4. Project management and its techniques.
5. Behavioural issues and Time management.

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

1. Understand the concept and essence of entrepreneurship.
2. Identify business opportunities and nature of enterprise.
3. Analyze the feasibility of new business plan.
4. Apply project management techniques like PERT and CPM for effective planning and execution of projects.
5. Use behavioral, leadership and time management aspects in entrepreneurial journey.

UNIT-I

Entrepreneurship: Definition, Functions of entrepreneurs, Qualities of entrepreneurs, Entrepreneur vs intrapreneur, First generation entrepreneurs, Women entrepreneurs, Innovation, Creativity, Intellectual property in entrepreneurial journey, Conception and evaluation of ideas and their sources, Need and importance of startups and incubation centers.

UNIT-II

Indian Industrial Environment: Competence, Opportunities and challenges, Entrepreneurship and economic growth, Small scale industry in India, Objectives, Linkage among small, medium and large scale industries, Types of enterprises, Corporate social responsibility.

UNIT-III

Formulation of Business Plan: Introduction, Business model canvas, Elements of business plan and its salient features, Technical analysis, Profitability and financial analysis, Marketing analysis, Executive summary. Choice of technology and collaborative interactions, Sources of finance and Incentives for entrepreneurs. Business firm registration procedures.

UNIT-IV

Project Management: Meaning and definition of project, Project organization, Project planning, Execution and control using CPM and PERT techniques, Human aspects of project management, Assessment of tax burden, Environmental issues.

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UNIT-V

Behavioral Aspects of Entrepreneurs: Personality determinants, Maslow's hierarchy of needs, Leadership concepts and models, Values and attitudes, Motivation aspects, Change behavior.

Time Management: Approaches of time management, Strengths and weaknesses, Time management matrix and the urgency addiction

Text Books:

1. Vasant Desai., Dynamics of Entrepreneurial Development and Management, 6th edition, Himalaya Publishing House, Mumbai, 1997.
2. Prasanna Chandra., Projects: Planning, Analysis, Selection, Implementation and Review, 8th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1995.

Suggested Reading:

1. Robert D. Hisrich and Michael P. Peters., Entrepreneurship, 5th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2005.
2. Stephen R. Covey., First Things First, 1st edition, Free press, New York, 2003.
3. S.S. Khanka., Entrepreneurial Development, 4th edition, S. Chand & Co. Pvt. Ltd., New Delhi, 2012.


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With effect from the academic year 2022-23

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

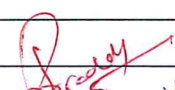
Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VI**

S. No.	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	20MEC23	Metrology and Instrumentation	3	--	--	3	40	60	3
2	20MEC24	Machine Design	3	--	--	3	40	60	3
3	20MEC25	Thermal Turbo Machines	3	--	--	3	40	60	3
4	20MEC26	Finite Element Analysis	3	1	--	3	40	60	4
5		Professional Elective - III	3	--	--	3	40	60	3
PRACTICALS									
6	20MEC27	Metrology and Instrumentation Lab	--	--	2	3	50	50	1
7	20MEC28	Machine Drawing Lab	--	--	2	3	50	50	1
8	20MEC29	Production Drawing Lab	--	--	2	3	50	50	1
9	20MEC30	Thermal Engineering Lab	--	--	2	3	50	50	1
10	20MEC31	Finite Element Analysis Lab	--	--	2	3	50	50	1
11	20EGCO3	Employability Skills Lab	--	--	2	3	50	50	1
TOTAL			15	01	12	--	500	600	22

L: Lecture T: Tutorial D: Drawing P: Practical**CIE - Continuous Internal Evaluation SEE – Semester End ExaminationA**

Professional Elective – III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20MEE09	Computational Fluid Dynamics
2	20MEE10	Additive Manufacturing
3	20MEE11	Operations Research
4	20MEE12	Industrial Safety and Maintenance

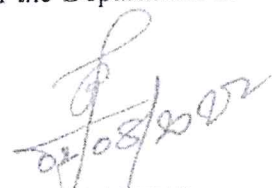

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**CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
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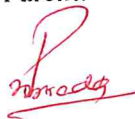
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GUIDELINES FOR B.E. / B.TECH. – VII - SEMESTER INTERNSHIPS

1. Students of B.E. / B.Tech. – VII - Semester are allowed to pursue internships if they have applied through proper channel and are selected through ON/OFF campus.
2. The candidates are permitted to undergo internships only after submission of an affidavit in the specified format. The parents shall sign on the affidavit in presence of concerned Head of the Department. The internship affidavit format can be downloaded from the Institute Website.
3. The student selected for internships either ON / OFF Campus shall attach official email communication from the concerned company addressed to HOD and Director-CDC to the affidavit.
4. The student shall be considered for permission with the recommendations of the concerned Head of the department and Director-CDC. The Heads of the Departments and Director-CDC are expected to thoroughly verify the cases before making their recommendations.
5. Heads the Department shall maintain the records of the following:
 - a. Internships through TPO (Minimum and Maximum period of Internships)
 - b. Off campus internships (Minimum and Maximum period of Internships)
 - c. Internships converted into Full Time Employment (FTE)
 - d. List of companies/ organizations offered internships (off and on campus separately)
 - e. Outcomes (Projects / Products / Start-ups / Publications / Special Appreciations, etc.)
6. Heads of the departments shall submit the required data to the Principal / Director-Academics whenever required.
7. The student is responsible to get the evaluation of CIE of Lab Courses and Assignments & Slip Tests of Theory Courses from the respective faculty.
8. Students are responsible to get the weekly attendance of the Internships attended and submit the same to the concerned HoD on every Saturday.
9. Students shall apply for permission through the concerned Head of the Department at least 6 working days prior to the commencement of internship.


PRINCIPAL

Encl: Affidavit by the Student and Parent.



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20MEE10

ADDITIVE MANUFACTURING

(Professional Elective-II)

Instruction	3	Hours per week
Duration of SEE	3	Hours
SEE	60	Marks
CIE	40	Marks
Credits	3	

Objectives:

1. To introduce students the basics of additive manufacturing, its advantages and limitations and concept of mass customization.
2. To familiarize students with different additive manufacturing techniques.
3. To teach students about STL file issues and familiarize them with various RP softwares.
4. To demonstrate various post processing techniques and rapid tooling concept.
5. To demonstrate the applications of rapid prototyping in various fields

Outcomes:

1. Understand the fundamental concepts of Additive manufacturing
2. Demonstrate the knowledge of various Additive Manufacturing Processes.
3. Analyze preprocessing and identify different post processing techniques in AM
4. Demonstrate the design rules for product development through Additive manufacturing.
5. Create awareness of Additive manufacturing in various applications,

UNIT-I

Overview: Traditional Manufacturing Vs Additive Manufacturing, Mass Customization, Reverse Engineering, fundamental fabrication process, AM Process chain, Classification of AM process, Advantages and Limitations of AM.

UNIT-II

AM Technologies: Vat Photopolymerization: Stereolithography (SL), Materials, SL resin curing process, Process Benefits and Drawbacks, Applications of Photo polymerization Processes.

Extrusion-Based AM Processes: Fused Deposition Modeling (FDM), Principles, Materials, and Plotting and path control, Process Benefits and Drawbacks, Applications of Extrusion-Based Processes.

Sheet Lamination AM Processes: Materials, Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC), Gluing, Thermal bonding, LOM and UC applications.

Powder Bed Fusion AM Processes: Selective laser Sintering (SLS), Selective Laser Melting (SLM), Materials, Powder fusion mechanism, SLS Metal and ceramic part creation, Electron Beam melting (EBM) Process

UNIT-III

Pre-processing in AM: STL Format, STL File Problems, STL file Repairs

Post Processing of AM Parts: Support Material Removal, Surface Texture Improvement, Accuracy Improvement, Aesthetic Improvement, Preparation for use as a Pattern, Property Enhancements using Non-thermal and Thermal Techniques.

AM Softwares: Features of various AM software's like Magics, Mimics, Solid View, 3D Rhino

UNIT-IV

Design for Additive Manufacturing (DFAM): DFAM Concepts and Objectives: Complex Geometry, Customized Geometry, Integrated Assemblies and Elimination of Conventional design for manufacture (DFM) Constraints. Rapid Manufacturing (RM), Unique Capabilities, Exploring Design Freedoms and Design Tools for AM.

Guidelines for process selection: Introduction, selection methods for a part, challenges of selection, example system for preliminary selection, production planning and control.

UNIT-5

Rapid Tooling : Conventional tooling vs Rapid tooling , Classification of rapid tooling.

Indirect Rapid Tooling Methods: Spray Arc Metal deposition , Investment casting , 3D Keltool Process

Direct Rapid Tooling Methods: Direct AIM , LOM tools , EOS direct tool Process

AM Applications: Applications in Design Industry, Analysis and Planning, Application in Aerospace, Automobile Sectors, Bio-medical Applications.

Text Books:

1. Chua Chee Kai, Leong Kah Fai, 3D Printing and Additive Manufacturing: Principles & Applications, 4th Edition, World Scientific, 2015.
2. Ian Gibson, David W Rosen, Brent Stucker., Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2nd Edition, Springer, 2015
3. K. Venuvinod and Weiyin Ma, Rapid Prototyping: Laser-based and Other Technologies, Springer, 2004.

Suggested Reading:

1. D.T. Pham, S.S. Dimov, Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, Springer 2001.
2. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.


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With effect from the Academic Year 2022-23

22CSC02

PROBLEM SOLVING AND PROGRAMMING LAB

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1.5

Course Objectives: The objectives of this course are to:

1. Master the fundamentals of writing Python scripts
2. Learn Python elements such as variables, flow controls structures, and functions
3. Discover how to work with lists and sequence data, and files

Course Outcomes: After completion of course, students would be able to:

1. Understand various Python program development Environments
2. Demonstrate the concepts of Python.
3. Implement algorithms/flowcharts using Python to solve real-world problems.
4. Build and manage dictionaries to manage data.
5. Write Python functions to facilitate code reuse.
6. Use Python to handle files and memory.

Laboratory / Practical Experiments:

1. Explore various Python Program Development Environments.
2. Demonstration of input/output operations
3. Demonstration of operators
4. Demonstration of selective control structures
5. Demonstration of looping control structures
6. Demonstration of Python Dictionaries.
7. Implementation of searching and sorting techniques.
8. Implementation of string manipulation operations
9. File handling and memory management operations

Text Books and References:

1. R.S Salaria, Khanna, (Programming for Problem Solving”, Book Publishing Co., Delhi
2. Jeeva Jose, Khanna,, “Taming Python by Programming”, Book Publishing Co., Delhi


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22MEC37

ROBOTICS AND DRONES LAB
(Common to All Branches)

Instruction	2T + 2P Hours per week
CIE	100
Credits	3

Objectives: The objectives of this course are to:

1. To develop the students' knowledge in various robot and drone structures and their workspace.
2. To develop multidisciplinary robotics that have practical importance by participating in robotics competitions
3. To develop students' skills in performing spatial transformations associated with rigid body motions, kinematic and dynamic analysis of robot systems.
4. Through projects done in lab, increase the true hands-on student learning experience and enhance their conceptual understanding, increase students' ability, competence and teamwork skills on dealing with real-life engineering problems

Outcomes: After completion of course, students would be able to:

1. Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics
2. Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
3. Demonstrate knowledge of robot controllers.
4. Use Linux environment for robotic programming.
5. Write Python scripts to control robots using Python and Open CV.

Lab Experiments:

1. Assembling of robot mechanical components, mounting of motors, sensors, electronic circuits to the chassis.
2. Connecting to electronic circuitry: motor drivers, incremental encoders proximity sensors, micro controller,
3. Different types of batteries, selection of suitable battery for application, safety precaution.
4. Introduction to Linux Command Line Interface: basic file and directory management and other useful commands
5. Controlling robot using Python: i) Move robot using Python code, ii) Make robot move in patterns using Python
6. Robot programming with Sensor inputs: i) Read sensor data using Python, ii) Visualize sensor data using Python, iii) Code robot to avoid obstacles by using sensor data
7. Open CV: i) Create an Image and display an image; ii) Read and change pixel values; iii) Create colored shapes and save image; iv) Extract the RGB values of a pixel; v) Reading and Writing Videos
8. Open CV: i) Extraction of Regions of Interest; ii) Extraction of RGB values of a pixel
9. Coding robot to work with colors, follow colored objects, identifying shape of the object-oriented
10. Projects: i) Making a line follower robot using a Camera; ii) Writing code for a complex function
11. Assembly of a drone

Suggested readings

1. <https://www.geeksforgeeks.org/robotics-introduction/>
2. <https://www.ohio.edu/mechanical-faculty/williams/html/PDF/IntroRob.pdf>
3. <https://www.idtechex.com/en/research-report/new-robotics-and-drones-2018-2038-technologies-forecasts-players/584>
4. <https://dronebotworkshop.com/>


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With effect from the academic year 2023-24

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VII**

S. No.	Course Code	Title of the Course	Scheme of instruction			Scheme of Examination			Credits
			Hours per week			Duration Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1		Professional Elective - IV	3	--	--	3	40	60	3
2		Professional Elective - V	3	--	--	3	40	60	3
3		Open Elective - II	3	--	--	3	40	60	3
4		Open Elective – III	3	--	--	3	40	60	3
5	20EGM04	Gender Sensitization	2	--	--	2	--	50	*Non Credit
6	20MBC01	Engineering Economics and Accountancy	3	--	--	3	40	60	3
PRACTICALS									
7	20MEC33	Project Part-1	--	--	4	--	50	--	2
		Internship	4-6 Weeks/ 180 hours						3
TOTAL			17	--	04	--	250	350	17+3

*L: Lecture T: Tutorial**D: Drawing P: Practical***CIE - Continuous Internal Evaluation****SEE – Semester End Examination**

Professional Elective – IV (3/3)			Professional Elective – V (3/3)		
S.No.	Subject Code	Name of the Subject	S. No.	Subject Code	Name of the Subject
1	20MEE13	Automobile Engineering	1	20ME E17	Renewable Energy Sources
2	20MEE14	Control System Theory	2	20ME E18	Digital Manufacturing and Industry 4.0
3	20MEE15	Mechanical Vibrations	3	20ME E19	Composite Materials and Testing
4	20MEE16	Supply Chain Management	4	20ME E20	Block Chain Technology

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Open Elective-II (3/3)		
S.No.	Subject Code	Name of the Subject
1	20CSO05	Basics of Artificial Intelligence
2	20CH O06	Fundamentals of Fuel Cells
3	20CEO02	Disaster and Risk Reduction Management
4	20ECO05	System Automation and Control
5	20EGO01	Technical Writing Skills

Open Elective-III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20ITO02	Principles of Internet of Things
2	20CSO02	Introduction to Web Technology
3	20ECO04	Principles of Embedded Systems
4	20PYO01	History of Science and Technology
5	20ADO01	Introduction to Python Programming


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20ME C29

PRODUCTION DRAWING LAB

Instruction	2	Hours per week
Duration of SEE	3	Hours
SEE	50	Marks
CIE	50	Marks
Credits	1	

Objectives: Students will learn to

1. Construct production drawings to enable produce the components in the shop floor and assemble them to meet the final functional requirements.
2. Create drawings for visualization using any modelling packages Solid works, CATIA etc.
3. Choose the Fits, Limits and Tolerances of parts for manufacturing and assembly.
4. Use the Conventions like surface finish, roughness, concentricity
5. Prepare Bill of materials for assembly and process sheet in manufacturing industry.

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

1. Interpret the working drawing/ industrial blueprint of various components.
2. Identify the different parts of the object with dimensional tolerances
3. Create the various part drawings using solid modelling package
4. Use the various functions of modelling soft ware: annotations, sheet making etc.
5. Prepare Bill of materials for assembly and process sheet in manufacturing industry.

List of Exercises/Experiments:

1. Introduction to production drawing: importance and need in industries
2. Conventional representation of Materials and machine components
3. Study of the terms used in the limit system and types of fits
4. To learn the need of geometrical tolerances, form and positional tolerances
5. Understanding surface roughness and its indication
6. Study the importance of process sheet preparation

Study the following assembly drawings and draw the component drawings with suitable tolerances and fits, surface roughness, bill of materials etc., Prepare the process sheet using any one of the modelling software tools: solid works/solid edge/CATIA/ProE/Auto CAD-MDT/Nx.

7. Stuffing box
8. I.C engine connecting rod
9. Revolving centre
10. Square tool post
11. Universal coupling
12. Steam Engine Cross Head
13. Drill Jig (Plate Type)
14. Non Return Valve
15. Blow off Cock


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Note : Students should prepare a minimum of 6 drawings

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Scheme of Instruction as per R20 Curriculum

B.E. (MECHANICAL ENGINEERING)**SEMESTER – VII**

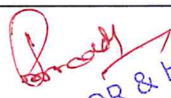
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			Hours per week			Duration in Hours	Maximum Marks		
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5	20EGM04	Gender Sensitization	2	--	--	2	--	50	*Non Credit
6	20MBC01	Engineering Economics and Accountancy	3	--	--	3	40	60	3
PRACTICALS									
7	20MEC33	Project Part-1	--	--	4	--	50	--	2
		Internship	4-6 Weeks/ 180 hours						3
TOTAL			17	--	04	--	250	350	17+3

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Professional Elective – IV (3/3)			Professional Elective – V (3/3)		
S.No.	Subject Code	Name of the Subject	S. No.	Subject Code	Name of the Subject
1	20MEE13	Automobile Engineering	1	20ME E17	Renewable Energy Sources
2	20MEE14	Control System Theory	2	20ME E18	Digital Manufacturing and Industry 4.0
3	20MEE15	Mechanical Vibrations	3	20ME E19	Composite Materials and Testing
4	20MEE16	Supply Chain Management	4	20ME E20	Block Chain Technology

Open Elective-II (3/3)		
S.No.	Subject Code	Name of the Subject
1	20CSO05	Basics of Artificial Intelligence
2	20CH O06	Fundamentals of Fuel Cells
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4	20ECO05	System Automation and Control
5	20EGO01	Technical Writing Skills

Open Elective-III (3/3)		
S.No.	Subject Code	Name of the Subject
1	20ITO02	Principles of Internet of Things
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4	20PYO01	History of Science and Technology
5	20ADO01	Introduction to Python Programming


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